NATURE MAGAZINE

December, 1948 50 Cents Vol. 41, No. 10

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Nature in Print

By HOWARD ZAHNISER

WILDNESS is a quality of life that is being valued more and more highly in the civilization in which these words are being written—and read. Stretched at length on a comfortable bed, bolstered with pillows, the writer has before him a light-metal bed-tray, and is, as it were, completely surrounded with convenience. But the steam whistle on one of the still-rolling, old-fashioned locomotives has just blown for the Riverdale crossing, and through the night it sounds like a great distance; like a long stretch of the Allegheny River years ago; like something wild. One can hardly imagine the variety of circumstances in which these words will find readers, but certain it is that the readers, too, will pause with startled delight at any sound or sight of wildness that punctuates the convenience in which they live. We all value wildness—even when it comes only symbolically in the sound of a railroad whistle, even when it comes only vicariously in print. That doubtless is one reason why more and more readers are becoming interested in Henry David Thoreau.

Here on the bed-tray before me, beside the pencil tablet, is a green-covered volume with the word *Thoreau* boldly across it in gold. That word, too, has become, to many eyes, a symbol of wildness that is as striking as an exclamation mark. Thoreau is one great writer (and his genius in the art of writing is unmistakable) who leaves his reader thinking less of the writing, more of the writer, mostly of the subject. His good biographer would surely be one who would leave his own readers thinking mostly of his subject. This volume meets such an expectation, leaving this reviewer at least more inspired to discuss Thoreau than to describe his biography. The biography, however, is nonetheless remarkable because it suggests such a remark, and its writer—Joseph Wood Krutch—has merited the appreciation of what one hopes will be a large number of readers. Professor Krutch sees "the instinctive sympathy with wild nature" as "probably Thoreau's first distinguishing characteristic" and "also the one that persisted with least modifications through life."

With this wildness Thoreau, as here presented, had also a mysticism like the Transcendentalists' and, finally, an independence or individuality in the midst of human society. These three aspects of Thoreau are those which seem to mark him for the attention of other men, and Professor Krutch comments that "probably he has sent more men into the woods (though few have actually lived as he did) than into either asceticism on the one hand, or political activity on the other." Thoreau's writings on the outdoors Professor Krutch nicely describes as "more varied" than other Nature writings and as having "a certain tenseness, a certain excitement which is unique."

It is apparent that the volume's jacket comment is apt in calling Professor Krutch himself "an original and subtle observer of nature", and it is a good fortune that to such a writer came the Thoreau assignment in this new series that is here introduced—the American Men of Letters Series. There was a time when Thoreau's part in the Transcendental movement, in which Ralph Waldo Emerson was so prominent, seemed most significant, and it remains of great significance in the history of American literature. More recently—especially since Gandhi's tribute to Thoreau's writings on civil disobedience—Thoreau's attitude toward society and his relation to government have seemed of outstanding interest. At all times he has had good reading for his descriptions of Nature, and the meaning he has for others as far as the influence of wildness is concerned has been deepening. One can speculate that his apprehension of the importance of wildness to civilized men may prove to be of most enduring interest—that, and his example of prudence in refusing to exchange any more of his life for "things" than they were worth—to him.

If this speculation is valid, Professor Krutch's discussion should long be read. It may not give as dominant importance to what is wild as is here implied, but it at least permits an individual reader to make such an emphasis for himself. And it is a most satisfying volume for reading. From beginning to end it escapes the simple literalness of recording and achieves the charm and enticement of a thoughtful and well-spiced discourse in which, nevertheless, the biographical facts and items of literary history are duly cited for the enlightenment of unacquainted readers and the casual reminding of the initiated.

The writer of these words assumes that the readers of this magazine are among those who already know who Thoreau was, where he lived and what he wrote—and respectfully suggests any encyclopedia to those who do not, although Joseph Wood Krutch's *Thoreau* would be much better. One also presumes that the readers of *Nature Magazine* are familiar with Edwin Way Teale (whose recent volume *Days Without Time* has now replaced *Thoreau* on this bed-tray), and respectfully suggests *Who's Who in America* to any who are not. Three chapters of this book have, in fact, appeared first in *Nature Magazine*, in recent issues. It is a coincident of publication dates that Mr. Teale's book is here with Professor Krutch's biography of Thoreau, but it is an appropriate coincident, for Teale himself is an influenced admirer of Thoreau. His most recent previous volume was a special edition of *Walden*.

The title of Teale's new work is one that Thoreau would enjoy, not only because of its reference to days when its author "left watches and calendars behind and, in a small way, seceded from the World of the Clock," but also because Teale like Thoreau can see a good double meaning in such an expression. "In two senses," he writes, "the chapters of this book represent adventures in a timeless world. The events that they record are part of the timelessness of nature. They are also part of days spent with little regard for the hour or the minute—days without time." And so they appeal to the overtimed reader who is sorely tempted to seek the same adventures (if there were not so many days without time), and who values most highly the vicarious experiences here described and illustrated—illustrated, indeed! If Teale were not so skilled a writer, such a magnificent assembly of brilliant and lucid photographs as he here presents would completely eclipse the text. It is a compliment to both his photography and his writing to note that each complements the other and neither can be said to be outclassed.

There have been other Teale volumes of which this has been true, but *Days Without Time* seems the most truly representative, the most authentic Teale book of all. It represents a journalism of the outdoors at its best, and Teale is essentially a Nature's journalist, a preeminent outdoor writer. He knows a good story when he sees it. He has the magazine journalist's

Bumblers

By CHARLES EDGAR GILLIAM

Aerodynamics prove
By laws of lift and size
The acrobatic bumblebee
Was not designed to rise.
Indeed, by fine analysis
Of surfaces that stall—
By every scientific test
He cannot fly at all!
So everytime I see him zoom
In pollen-laden flight,
I wonder if the specialists
Or my weak eyes are right.
And everytime I hear a plane
Has crashed on land or sea,
I feel men are the bumblers
And not the humblebee!

skill for relating a wealth of intriguing incidents to a theme—"Oddity Battles," "The Strength of the Frail," "Tail Tales." He has a flair for the unusual—"The Swimming Cat," "Night Above the City," "The Duck That Came to Dinner." We are excited and delighted in his writings, party because they are by selection so unusual in their topics, but also simply because Teale himself is so healthily and buoyantly excited and delighted by what happens. Thus the circumstances of his own discovery of precious letters of W. H. Hudson in the Smithsonian Institution seem much more interesting to us in reading "Letters from the Pampas" than do the letters themselves. What a rich privilege in reading there is, indeed, in having so skilled and vivid a roving reporter, whose nose for news is sensitive to W. H. Hudson and John Burroughs (of whom he also here writes, in "Slabsides in Spring"), a true outdoor writer.

"The beauty of nature," Teale writes, "is every generation's gift," and he closes *Days Without Time* with a paragraph for which the reader has been well prepared: "To dwell with this beauty of the out-of-doors, as much as we can, is the better part of wisdom. Here we feel ourselves losing nervous tension, relaxing like a drought-dried plant in a summer shower. Here the hunger of our eyes for the green of trees and the color of flowers is satisfied. Here the longing of our ears for the sound of wind in the grasses and the lap of waves on sand is gratified. Here there is beauty to lift the heart, and calm endurance to speak of courage. And here there is something more, something magical, something that fills a deep need of the human heart."

Thoreau would have appreciated this even as I do, I believe, and Thoreau, I think, would also have marveled with admiration at Teale's photographs. What Thoreau would have thought had he seen me discovered in this same bed a few early mornings ago looking at these photographs, I know not. It was no quiet matutinal scene but a noisy confusion of pajamas as Karen and Esther wormed in on either side, Edward squirmed on top of me, and Mathias crowded a head over my shoulder. It is possible that Thoreau would have envied me. He might have pitied. Teale, I know, would have enjoyed it, as certainly he should, for it was a superb tribute to the appeal of his photographs. That was one good picture he missed.

Henry David Thoreau. By Joseph Wood Krutch. The American Men of Letters Series. New York: William Sloane Associates. 1948. xiii + 298 pp., with frontispiece portrait, note on sources and acknowledgments, and index. $3.50.

Days Without Time: Adventures of a Naturalist. Illustrated with 144 photographs by the Author. By Edwin Way Teale. New York: Dodd, Mead & Company. 1948. 283 pp. with index. $6.

Wildlife Opportunities

Professional Opportunities in the Wildlife Field. By David B. Turner. Washington, D. C. 1948. Wildlife Management Institute and the American Nature Association. 208 pages. $1.00.

With funds provided by the Wildlife Management Institute and the American Nature Association, and under the direction of Dr. E. Laurence Palmer of Cornell, David B. Turner carried on an intensive study of what the field of wildlife offered in the way of professional employment. The author, in his report on this study, first discusses individual training for such employment, and then opportunities existing with institutions of various kinds, with the federal government and with state and provincial governments. In compiling this information, Dr. Turner was plowing virgin soil, and the crop of information he reaped from it is of outstanding basic importance. Wildlife conservation has grown rapidly in its extent and ramifications, and the data about its growth and present status were widely scattered. Dr. Turner has brought them together in this book, which will be desired for the library of anyone in the wildlife field. A nominal price of one dollar has been placed on the book—which cost more than that to produce—and distribution is by the Wildlife Management Institute, Investment Building, Washington 5, D. C.

An Arabian Stallion

King of the Wind. By Marguerite Henry. Chicago. 1948. Rand McNally and Company. 175 pages. Illustrated by Wesley Dennis. $2.75.

This is the charming story of a high-spirited Arabian stallion that became the most honored horse in all England. It is also the story of a Moorish boy who cared for him. Marguerite Henry appears to have a special love for horses, for this is a story with all the drama and appeal of her earlier *Misty of Chincoteague*, a tale of the horses of the island off the Virginia coast. The author writes for an audience of young people between the ages of seven and fourteen, and this immediate volume will add to the large following she has in this age-group. The illustrations by Wesley Dennis are delightful.

Naturalists' Directory

Announcement is made of the publication of the 35th edition of *The Naturalists' Directory*, which contains names, addresses and special subjects of study of professional and amateur naturalists in North and South America and some foreign countries, as well as other helpful lists. Classification of the entries is geographical; in the United States by states. The publisher is the Cassino Press, Salem, Massachusetts, and the price is three dollars.

Wonderful!

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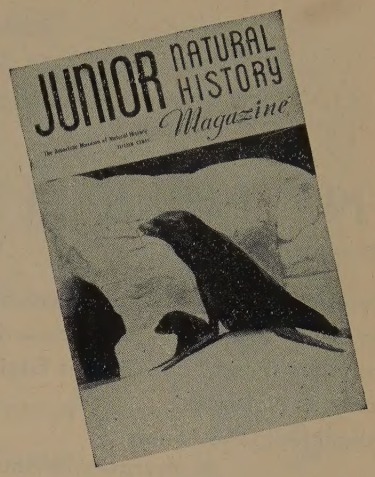

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IN THIS ISSUE

December, 1948 Vol. 41, No. 10

Mockingbird.....Fredric Sweney Cover
Nature in Print.....Howard Zahniser 506
Bumblers (Poem)....Charles Edgar Gilliam 506
Contents Noted.....R. W. W. 511
Ookpikjuak, the Lonely
A. Marguerite Baumgartner 513
The Sycamore (Poem).Helen Hamann Geiger 516
Meteorological Medley.Edna Hoffman Evans 517
Litchi, Chinese-American..John M. Gregory 521
Two Little Christmas Bears.Ellsworth Jaeger 523
Angel's Trumpet.....Sophie Van Hoesen 524
Nature's Model-T Man.....Edwin D. Neff 525
Resting Place (Poem).....F. Scott Avery 528
Christmas Plants...E. Laurence Palmer.529-536
"Colorado's Greatest Slaughter" (Editorial). 537
Are Weedicides Wise?.....J. David Larson 538
The White Dwarf Stars.....Isabel M. Lewis 541
Hunter and Dogs (Poem)
John Gallinari Whidding 542
Marsh Marigold.....Edwin F. Steffek 543
A Winter Thought (Poem)
Katherine Carr Henze 543
Can You Crack These?....Edward Dembitz 544
Christmas Song (Poem)....Paul H. Oehser 544
The School Page.....E. Laurence Palmer 546
The Nest (Poem).....Eleanor Thayer 546
Camera Trails.....Edna Hoffman Evans 548
American Nature Study Society..... 554
Under the Microscope..Julian D. Corrington 555
Index to Volume 41..... 556

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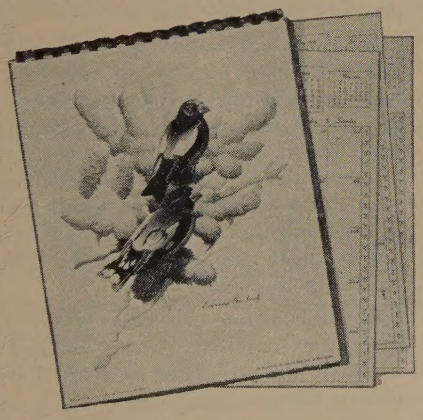

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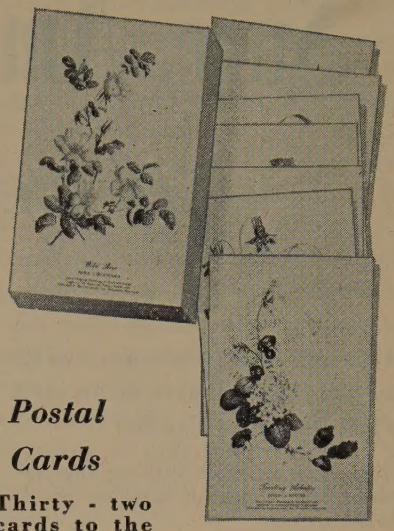

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Contents Noted

MANY people got a brief glimpse at the fascination of Nature study recently when airplane pilots in California reported flying through concentrations of spider webs at altitudes as high as two thousand feet—not that they knew at first what these filmy scarves were, and the "flying disc" story was in danger of being revived. A number of species of spiders break up their family groups by the device of spinning their own "balloons" or "parachutes" and migrating limited distances on the currents of the air. Usually the traveling spiders do not go to any considerable height, but it just happened that the air currents were such that warm up-drafts carried the arachnids in numbers to unusual altitudes, the maximum reported being twenty-five hundred feet.

•

FROM the U. S. Fish and Wildlife Service comes the report that the sale of the so-called "duck stamp", required on every duck hunter's license, showed a decline of nearly three hundred thousand during the 1948 fiscal year, as compared with the all-time high of the 1947 fiscal year. This is encouraging. Reason for the decline is assigned to the tighter waterfowl hunting regulations, which made hunting less attractive to some. We doubt that much of the decline can be attributed to restraint on the part of waterfowl gunners, although there are no few in their ranks who believe that the only way that migratory waterfowl will recover in numbers is through a closed season, or series of them.

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ALTHOUGH the Federal law to "safeguard and consolidate certain areas of exceptional public value within the Superior National Forest, State of Minnesota," is safely on the statute books, this is no time to sit back complacently and feel that the job is done. Quite the contrary, for it is vital that additional purchases of private lands within the same general area be accomplished, and quickly, if the safeguarding and consolidation are to be carried through to the intended conclusion. Space here does not permit detailing all the aspects of this important conservation issue, but anyone interested in conservation should be informed about it. They can become so by writing to the Quetico-Superior Foundation, 919 North Michigan Avenue, Chicago 11, Illinois.

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FROM Palo Alto, California, a reader sends a letter from the *Palo Alto Times* in which the correspondent makes a comment that our friend feels deserves wider attention. The letter says: "The deer season is nearing its close. I wish there never would be another. It has brought us heartache. Just below our cabin, E——— saw a deer hobbling along on three legs, one in front horribly shattered at the knee. He put the poor animal out of its misery. Some fishermen at Berger Creek fished a live doe out of a pool. It was so badly injured that it was a mercy to dispatch it. A buck similarly injured near here was mercifully shot. These instances are within four miles of us. This is called sport. No wonder the buzzards constantly circle the sky." Such sad examples of wild cripples, both birds and mammals, are, we fear, destined to increase as more and more incompetent gunners take to the field in response to stimulation by hunting magazines and game commissions. And, more and more, we are convinced that no hunting licenses should be issued except to individuals able to pass a rigorous examination, not only of their ability as marksmen, and how to recognize legitimate game, but of their understanding of proper outdoor behavior.

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READING of widespread destruction of corn crops in parts of Mississippi, Robert Sparks Walker, Tennessee naturalist, asked State authorities about the destruction of crows in the same area. These officials reported that there were few or no crows to be found, which moved Mr. Walker to point out, in *Flower and Feather*, that crows will "catch a sufficient number of grasshoppers to hold them in check." Based upon his observations at the Elise Chapin Wildlife Sanctuary for three decades, he says: "During the last sixty years the crows have not wrought as much damage as the hunters have done in our wildlife sanctuary over a period of four months. Last season they killed all of the bobwhites, mourning doves and doubtless shot other kinds of birds, defying the fifty *No Hunting* signs furnished by the Tennessee State Conservation Department. They even riddled with shot the most of the signs, tore down half of them, and took possession of the property as if it were their own. When accosted, each one produced a hunting license." We have long been concerned with the problem of protecting the private wildlife sanctuary, and Mr. Walker advances an interesting suggestion as to how this should be done when he says that issuance of a hunting license "should cover only such property as is owned by the State and the various counties. The State issuing such a license should be made responsible for all damages which are directly traceable to the person to whom they have sold a license. In turn, the Conservation Department should require every person who purchases a license to hunt to make bond for his acts. Not until such a law is enacted and enforced by the Conservation Department can owners of wildlife sanctuaries and farms expect relief."

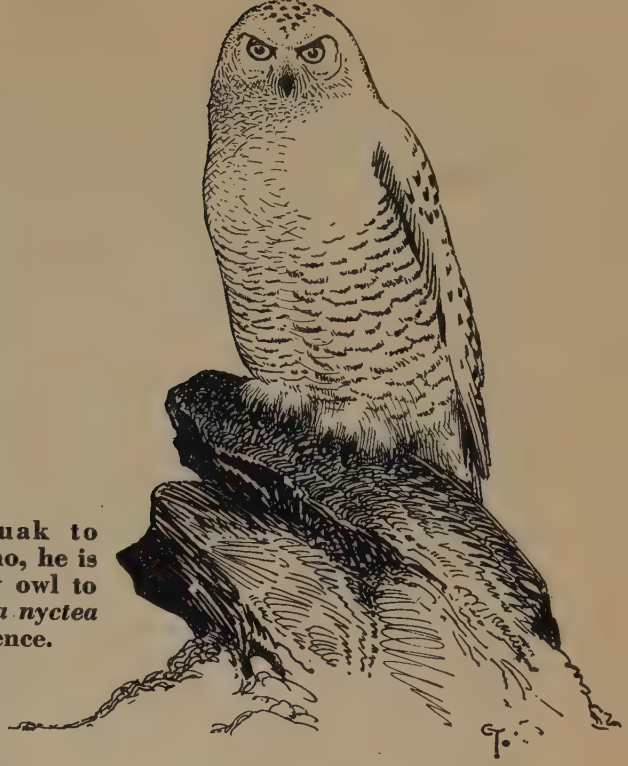
R. W. W.

". . . a white bolt from the skies descended upon the fox, yellow eyes shooting fire, diving and swooping, ripping into the heavy hair with powerful beak and sharp talons."

Ookpikjuak, the Lonely

By A. MARGUERITE BAUMGARTNER

Illustrated by Clarence Tillenius



Ookpikjuak to the Eskimo, he is the snowy owl to us; *Nyctea nyctea* to science.

THE tundras were carpeted with a mat of snowy *Dryas* when Ookpikjuak first opened his fierce yellow eyes upon the world. The last snows in the hollows had melted under the early July sun, but far out on the blue waters of Hudson Bay a line of ice still shimmered against the horizon.

Ookpikjuak had been the first of the little owls to peck his way through the dirty white shell beneath the soft breast of Old Snowy. Now there were seven of them in the shallow depression in the reindeer moss that covered the knoll. They were about two days apart, ranging in size from the tiny white chick that tumbled helplessly among the broken shells, shreds of fur, feathers, and castings that lined their nest, to Ookpikjuak, clad in a heavy coat of long gray down that already showed the tiny quills of his winter plumage about the glaring eyes and powerful beak.

They were alone much of the time now, for the local supply of lemmings and small birds had long since been exhausted and the parents were foraging in ever-widening circles. Mosquitoes and small flies buzzed their irritating chorus above the tender owlets. The summer sun, eighteen hours a day, beat mercilessly upon the bare nest, and Ookpikjuak gazed with dull longing at the little pool at the foot of the knoll, fringed with arctic rhododendron and tall sedges that cast wavering shadows across the green water. Resentfully he pecked at a small sister who was chewing hungrily at his toes. Stretching his long neck he peered across the wind-swept barrens for a glimpse of white, but neither parent was in sight.

Then, beyond the pool, appeared a form that made the little owl's blood race in his veins. Loping lazily across the marshy flats was an arctic fox, nose to the wind and headed straight for the owls' knoll. He paused at the pool to sip the tepid water, then leaped gracefully across and sauntered up the lichen-covered slope.

Ookpikjuak stiffened for the assault and met the fox with a mighty hissing and snapping of his tiny beak, but in spite of his bravado the little owl shrank back against the smaller brothers and sisters, who only stared sullenly at the intruder. For a brief instant the fox paused, gathering his lithe muscles for the spring. In that moment of grace Ookpikjuak tumbled awkwardly out of the nest and scrambled on all fours, half hopping, half rolling down the knoll. The fox leaped, and with the deadly accuracy of a killer his jaws closed rapidly upon one helpless form after another. Simultaneously a white bolt from the skies descended upon the fox, yellow eyes shooting fire, diving and swooping, ripping into the heavy hair with powerful beak and sharp talons. The fox made one last spring, then, with a limp gray owlet dangling from his jaws, ran for the rocky shore line, pursued venomously by Old Snowy until she lost him in the tumbled mass of granite.

The marauder's visit had been brief but lethal. Five crumpled forms lay lifeless in the bottom of the nest; Ookpikjuak alone had escaped by the bare margin of two days' seniority. Peeping dismally, he now stumbled back to the nest, where his mother humped desolately over the ruins of her home. He was hungry as he had never been before, but the lemming she had brought from the far meadow had been lost as she dived upon the fox.

But now his father, the White One, appeared, carrying in his talons a small plover. Lemmings were scarce this year, for the cycle of their abundance had not yet reached its peak, but there were always shore birds in the marshy sloughs below the knoll, and longspurs and snow buntings on the windy ridges. Ookpikjuak eyed his father with admiration. A good hunter was the White One, who had provided well for his mate and their large family in spite of the scarcity of rodents. And a handsomer owl never coursed over the tundras of Keewatin. He was not so large as the female, but more beautiful, for the glossy white plumage was barely flecked with blackish, while hers was heavily barred and often blood-stained on the breast from the endless supply of meat she must shred for her young ones.

Now there was but one left, and little Ookpikjuak grew fat and strong on the rich diet of young birds that were beginning to run everywhere about the

marshy meadows and across the crisp reindeer moss of the sun-baked tundras. Ducklings there were in the innumerable little lakes of the lowlands, a choice variety of downy young plovers and sandpipers, and the plump chicks of the ptarmigan, grouse of the Northland. Often Ookpikjuak wandered down the knoll to the pool and nestled in the little fringe of shade of the stunted rhododendrons that overhung its banks.

Through the long lonely days he sat quietly, adding layer upon layer of fat over his strengthening muscles, while the quills of adolescence lengthened and burst. Circles of white feathers formed spectacles around the great yellow eyes, and an epaulet of white appeared on the bend of each wing, followed at last by a mantle of barred brown and white that concealed the gray down of babyhood.

By the time the rains of August had overflowed the pools, and changed the crackling gray of the reindeer moss to a spongy carpet, Ookpikjuak was ready to try his wings. Flapping wildly he now stumbled up the knoll toward the White One when he brought food, or hopped with wide-spread pinions to greet Old Snowy as she soared homeward across the grassy meadows.

It was on a wild, gray morning when the wind was rolling tumultuous breakers against the rocky shore, and the myriads of black flies and mosquitoes were silent in the sodden grass, that Oopikjuak reached his majority. He had clambered to the top of the knoll and stood a full two feet tall, leaning against the wind, while his keen eyes scoured the distant lakes and meadows for a spot of white. Now she was coming closer, the Old Snowy, but as he stretched in eager anticipation she passed by him and circled with strong, steady wing beat until she was again passing the impatient young owl. As she flapped over him Ookpikjuak hopped angrily after the half-grown duck that dangled from her talons, and found himself soaring on outstretched wings into the wind. A great surge of power swept through Ookpikjuak. Raising and lowering his wings rhythmically, he followed Old Snowy down the knoll and came to rest beside her, panting and exuberant.

". . . he learned to differentiate between the browns and golds of the dry grasses and the browns and golds of a young ptarmigan."

And now Ookpikjuak followed his parents on their eternal hunting trips, the three together, companionable and carefree. Daily they ranged farther, and the young owl learned the lessons of survival. For a time they still dropped food for him, although it no longer had to be torn into small bits. Eagerly he followed them as they coursed on silent wing over the grassy lowlands and the quiet blue water of the little lakes. In time he learned to differentiate between the browns and golds of the dry grasses and the browns and golds of a young ptarmigan. He learned how to maneuver his heavy body from a measured horizontal flight into the abrupt vertical plunge upon a swimming duck. He learned to watch for the runways of the lemming through the crowberry and reindeer moss of the uplands, and to detect the rustle of its nondescript brown form as it scuttled from hummock to hummock. Rarely as they were seen, they were worth watching for, for the owls had a definite preference for mammal food when they could find it.

And then came a day when the tundras were quiet. Young birds were full grown and more wary, and for several weeks there had been so much movement that the owls could no longer find their prey in the customary haunts. Shore birds and ducks, longspurs and snow buntings had left the countryside in great hordes, for the air was crisp and winter was creeping down from the North. Even the ptarmigan, which should have remained in abundance, had ominously disappeared, following the lemmings in their periodic cycle of scarcity.

As they flew slowly over the deserted lakes Ookpikjuak noticed that Old Snowy was drifting off toward the rocky shore line, and as the hours passed and she did not return he realized that their days of companionship were over. He would not see her again, his mother, but she had done well by him and he no longer had need of her.

And now Ookpikjuak must learn a new trick, or starve on the almost deserted barrens. After one last, unsuccessful foray, the young owl followed the White One to the rocky shore. Here, at high tide, the water lapped the boulders and made deep pools where the small fish came in to feed. With every appearance of lazy indifference the White One stretched out upon the rock at the water's edge, supine and comfortable. But his head was turned toward the water and his great eyes were alert. Ookpikjuak perched on a neighboring rock and watched his father intently.

". . . he could discern the shadowy form of a little screech owl humped over the body of a deermouse."

Without comprehending, he had long since learned that the White One's ways were wise ones, and that he had much to learn from them. Motionless they waited; then at last a small splash and a glint of bright fin in the autumn sunlight flashed in the little pool. Quicker than eye could follow, the White One had scooped out a small trout and dragged it back from the water's edge in his viselike talons.

Fish for dinner! Ookpikjuak, then, must also learn to angle, and he promptly chose a suitable-looking boulder and spread himself out as he had seen his father do. The wait was not long, but his muscles were untrained. When a fish broke water Ookpikjuak's foot splashed awkwardly and came out empty. With a flounce of annoyance, the young owl sailed back to the meadows for game he could understand. Dejectedly he ranged over the deserted lakes and marshes. A thin film of ice had already spread over the quiet waters and the tundras and grasslands were dead. As the hunger that gnawed his stomach crept out into his aching muscles Ookpikjuak returned to the shore and picked the scattered bones that the White One had left. They were tasty, these creatures of the Great Water. Resolutely he tried again. Another eluded him, and another, but at last the young owl hooked a small grayling and flapped it out on the rock before it could tear itself loose. Ravenously he ripped it open and gulped down great slabs of the white flesh. The next fish came more easily, for the children of the wild must learn their lessons quickly or starve. Now again Ookpikjuak was adding on the layers of rich fat over his heavy body that would keep him warm and strong through the long winter.

Then came the week of the great storms, when a roaring northeast wind lashed the Bay into an avalanche of black water and dashing spray that froze as it fell, leaving an ever-increasing coat of ice over the rocky shore. A line of eider ducks scudded southward, passing the two owls far out over the turbulent bay. To Ookpikjuak they were but a streak of black shadows against the overhanging clouds, but in the mind of the White One they stirred a vague remembrance. Once before there had been icy storms, and an empty belly, and a line of ducks silhouetted against a murky sky. With the next dash of spray the White One rose off his rocky perch and sailed majestically down wind. Ookpikjuak followed, not knowing where, and but dimly sensing why.

For many days the two owls followed the irregular coastline to the southward, but everywhere it was the same. Occasionally they found a matting of white feathers and bleached bones of a ptarmigan, more rarely a belated flock of ducks or plovers. For the most part they fished wherever they could find open water and moved onward toward better hunting grounds. From time to time they passed other snowy owls along the long trail, but the hunting was too precarious to encourage sociability, and the White One always shied away from his own kind.

One morning the sun rose directly ahead of them, for they had reached the bend where the shore of Hudson Bay circles around to the east. While Ookpikjuak blinked in wonder, the White One veered as if guided by an internal compass toward green horizon to the southward. And now, day and night, they traveled over a carpet of trees, trees such as the young snowy owl had never seen, stiff green spruces and lacy tamaracks, for uncounted hundreds of miles, a shadowy sea of green, broken occasionally by alder-fringed lakes and serpentine rivers. About the water the two owls fared well enough, but the woods were deep and forbidding to these dwellers of the windswept tundras, and they moved on restlessly, stopping only for food.

They came at last to a vast stretch of sunny sand, rising in long winding hills and deep valleys as far as their eyes could see. Beyond the sand to the westward lay the placid blue waters of Lake Michigan, rimmed with a broad fringe of rough ice that caught the last rays of the evening sun. There were little rafts of ducks floating here and there at the periphery of

the shore ice. There were mouse and rabbit tracks everywhere in the snow that had drifted in the valleys. Here was food at last, here was space in abundance, and illimitable water and sunlight and wind that breathed the spirit of home to the weary owls.

They spent the night on a little mound overlooking the dunes, and were astir as the dawn tinged the irregular pattern of the ice fringe along the lake. The ducks were milling sleepily in their compact little rafts, stretching and splashing their wings and cackling among themselves in unsuspecting contentment. The two owls attacked together; two balls of snow on swift, unerring wings, they plunged into the midst of the terrified, bewildered waterfowl. Together they turned toward the shore and flew laboriously, laden with the most sumptuous breakfast they had seen in many weeks.

Near the shore was a pile of driftwood interwoven with bundles of dry grass, the only promontory on the entire beach. Unfamiliar with the devices of Man, these dwellers of the arctic solitudes approached it without misgivings. A sharp report shattered the still morning air and a terrible pain throbbed through the left leg of Ookpikjuak. The duck fell from his grasp as the limp talons relaxed. With eyes glazed by fear and agony he saw the White One in a crumpled heap upon the sand, and a two-legged creature in a baggy, brown canvas coat running from the pile of driftwood. Another shot echoed against the dunes and Ookpikjuak flapped heavily to the far hills.

"Missed him!" shouted the man to his companion in the duck blind. "But by cracky, look here, Pete. How's this for a day's bag? Two ducks and an owl with one shot!"

He turned the White One over with a boot tip, while a squat little man, beswaddled in elaborate hunting togs, waddled up behind him. "Say, Hank, he's really a beauty! Pure white, almost. I believe I'll have him mounted; I've always wanted an owl for our store window."

"Too bad we missed the other one," observed Hank. "Duck thieves! I tell you, Pete, these owls are a murdering lot. And now our whole durn raft of ducks is gone. Guess our hunting is over for today. Let's get back to that pan of ham and eggs."

Smacking their lips over their prospective feast, the men picked up the White One and Ookpikjuak's breakfast, leaving a thin trail of blood across the drifting sand.

Through the lonely day Ookpikjuak crouched in the grass of the farthermost valley, his leg lying stiff and useless beneath him. For a time he was too sick to care about the loss of the duck, but as the hours dragged over the dunes the old gnawing returned at the pit of his stomach. At dusk he finally pushed himself unsteadily from the ground and flapped in wavering misery down the valley.

Near the border of the woods his keen ears detected a slight rustle, and soon he could discern the shadowy form of a little screech owl humped over the body of a deermouse. Half-crazed by hunger and pain, Ookpikjuak swooped down upon her and the smaller owl slipped back into the shelter of the trees, leaving her prey behind her. Ravenously Ookpikjuak tore at the mouse, tottering wildly as he tried to use his one leg for both prop and anchor, flapping his great wings in an effort to balance himself. Revived now by the food in his aching body, Ookpikjuak drifted on down the valley and was able to capture a few mice for himself.

And so the winter passed. The leg healed slowly, but the dunes were a rich hunting ground and the crippled owl managed to eke out a meager existence in spite of his handicap. Out in the lake the ducks came and went, but Ookpikjuak never again ventured from the shelter of the hills. The memory of the White One, handsome, fearless father and companion, lying motionless in the sand, remained an indelible picture.

As the days grew longer and the sun beat warmly again upon the lonely owl, a vague restlessness stirred in the heart of Ookpikjuak.

In the woods behind the dunes the oaks were turning yellow-green and the flies had begun to hum incessantly in the dune grass. As the glowing fire of the sun sank into Lake Michigan the last red rays were reflected in the gleaming bodies of a flock of sandpipers. Circling high over the dunes they disappeared to the north. Sandpipers! As if in answer to a signal Ookpikjuak rose from his sandy hummock and turned his face, too, to the north. Over and beyond the dunes, over the carpet of trees that stretch for hundreds of miles across Canada's southern provinces, up the barren coast of Hudson Bay to the tundras of Keewatin.

Where the white tents of (Continued on page 552)

The Sycamore

By HELEN HAMANN GEIGER

Why her loved appeal
Above the many God has given
Of trees, best benisons of Heaven?
More than exquisite tracery of elm,
Or dignity of poplar, pine—
All evergreens,
More than hugging warmth of apple, cherry—
All fruit that leans
To earth.
Chameleon delight her way
Of dress, a moody mistress' whims,
Now discarding scarf of gray,
Flaunts amethyst against her ivory limbs—
Most 'live at dusk.
Her earrings, pendant lobes of green,
Now fat and brown, as if to preen
For Christmas season!
This then, the reason?
Or could it be that
In her branches high,
Small Zaccheus sat
To watch his Lord pass by?

Meteorological Medley:

That Is Texas Weather

By EDNA HOFFMAN EVANS

A GREAT many things have been said, written, sung or thought about the State of Texas. A great many of those things are true, but unbelievable. Others are unreliable, but unforgettable. A few are even unprintable. Add unpredictable to all these and you have an apt description of Texas weather.

Texas has lots of weather—all shades, brands and variations can be found within the 267,339 square miles that make up the state's total area. There are parts of Texas where they say, and with reason, that "only fools and strangers predict the weather." Weatherwise natives also add that "if you don't like this weather, just wait a minute." Sometimes, it almost seems to change that fast.

Texas is a big state—even people who never visited it know that. They may not know, however, that Texas is one and a half times larger than California, 224 times larger than Rhode Island, and has 143,000 more square miles than the whole United Kingdom.

All these miles considered, no wonder Texas has so many varieties of weather—often at the same time.

To bring the subject more into line with scientific meteorology, Texas has all three of the climatological conditions into which North American weather is divided. It has (1) marine, (2) continental, and (3) mountain type of climate. The continental and mountain types are in true form, while the marine type is modified and subdued somewhat (as much as Texas weather can be subdued) to a coast climate.

By far the greater portion of the Lone Star State lies within the continental climatic area, with the mountain type confined to a relatively small, Trans-Pecos area in west Texas, and the marine type prevailing in a comparatively narrow strip along the coastal plains.

Since the upper edge of the Texas Panhandle is 801 miles north of the southernmost point on the Rio Grande, there is considerable difference in the seasons. While people in Amarillo are wearing long underwear and earmuffs, and shivering in the frosty weather, other Texans in Galveston or Brownsville may be sun-bathing and swimming.

By actual records, the southern sections of the state become frost-free in the spring more than three months ahead of the northern Panhandle. In the fall, there is a range of more than two months between the first frost dates. The growing season, accordingly, varies from an average length of 185 days to better than 300 days, with a difference of more than five months between Gulf Coast sections and the northern Panhandle.

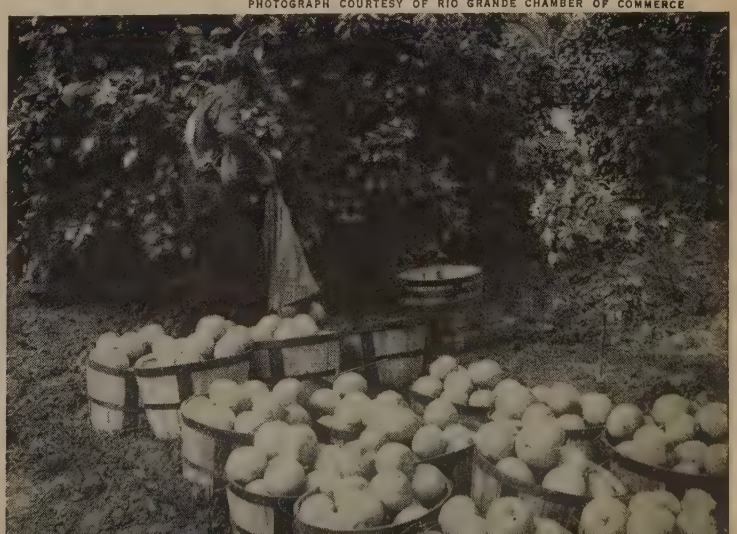
To collect data on Texas weather, the United States Weather Bureau operates approximately 250 temperature reporting stations, and has somewhere in the neighborhood of 600 rainfall stations. The regional office in Fort Worth supervises not only Texas but four other states as well—Louisiana, Arkansas, Oklahoma and New Mexico.

Texas weathermen have nearly every phase of weather and weather forecasting to deal with. They

It can snow in Texas, as this photograph taken on the campus of the Amarillo Junior College indicates, but, in contrast, the Rio Grande Valley can produce such grapefruits as these. Texas weathermen, however, must be on the alert in winter to give advance warning of frosts that might damage the citrus crops.

PHOTOGRAPH COURTESY OF AMARILLO CHAMBER OF COMMERCE

PHOTOGRAPH COURTESY OF RIO GRANDE CHAMBER OF COMMERCE



PHOTOGRAPH COURTESY EL PASO CHAMBER OF COMMERCE

There is desert country in Texas, too. Here is the highest point in Texas, Guadalupe Peak, which has an altitude of 8751 feet.

must warn citrus growers in the Rio Grande valley of frost possibilities. They must also issue crop bulletins designed for the corn and wheat growers around Amarillo. Other specialists report for duty at 1 a.m. in order to use midnight observations for bulletins of major interest to rice growers along the coast. Still others prepare reports for the growers of cotton, carrots, cabbage, tomatoes, onions or spinach.

Out on the ranges, cattlemen are mainly interested in possible cold waves. Thus, it is the Texas weatherman's job to advise them when freezing weather is expected. The rancher and his cowboys then arrange supplementary feeding for the stock, and see that new-born calves are protected.

In the cities, air lines, railroads and trucking companies are interested in the weather. Dispatchers receive special bulletins so they know what their engineers, pilots and drivers will have to contend with in the way of weather in other parts of Texas. Both inter- and intra-state shippers want to know those facts, too, so they can send perishable goods and livestock during the most favorable weather.

So far as dangerous weather is concerned, Texas meteorologists have to keep their weather eyes peeled for three kinds. First, there are hurricanes and, from mid-June until late October, the coastal region is hooked to the "hurricane circuit," which extends from the northern Atlantic coast, around the tip of Florida and along the Gulf coast to Mexico, with assorted Caribbean islands as additional members.

Hurricanes mean something in Texas, especially around Galveston. The state's most destructive storm was the "Galveston Hurricane," a tropical disturbance that roared out of the Gulf and struck that coastal city September 8 and 9, 1900. No actual count of lives lost was possible, but the minimum has been set at 5000 and the maximum at 8000. Property damage was estimated at $30,000,000. The "Second Galveston Hurricane" on August 17, 1915, did $50,000,000 worth of damage and took 275 lives during its three-day course across Texas. Four years later, on September 14, a hurricane struck Corpus Christi, and in two days cost 284 lives and caused $20,000,000 property damage. Hurricanes, then, are no strangers to Texas.

While the maximum wind velocities recorded by these severe tropical storms are nowhere nearly as high as those reported elsewhere, no accurate record remains from the first Galveston hurricane. The anemometer at the weather station there was blown away when the wind reached 65 miles an hour. During the second Galveston storm, fifteen years later, the wind velocity was clocked at 71 miles an hour.

Hurricanes or no hurricanes, Texas is a windy country. In summer hot, dry winds sweep relentlessly over mile after mile of sunbaked prairie. In winter cold winds, sometimes wet and sometimes dry, blow over the same expanse of territory. Up in the Panhandle a visitor is supposed to have asked, "Does the wind always blow this way?" And to that a Texan replied, "No, sometimes it blows the other way." By actual records from a dozen widely scattered

PHOTOGRAPH COURTESY BEAUMONT CHAMBER OF COMMERCE

Texas weather helps produce rice, among many other crops. A scene at the Texas Ricelands company farm. Weathermen make special forecasts for the rice growers.

PHOTOGRAPH BY THE AUTHOR

When Texas weather goes on a rampage in the form of a tornado it leaves behind such scenes as this. Twenty-four hours before the house had a roof.

regions, the average annual wind velocity has been set at 10.01 miles an hour. To which a non-native may sometimes mutter, "It isn't the velocity of the blasts, it's the blasted monotony!"

Tornadoes, which occur widely throughout the Gulf Southwest and Mississippi watershed, do not avoid Texas. Some of them have caused great destruction over small areas in the state.

Texas weathermen, like all others, do not predict tornadoes. Indeed, such predictions are ruled out by Weather Bureau regulations. Why? Because no one can say for sure where one of those intense funnels of wind will form, or whither it will go after it does get itself organized. The damage will be great, but its path will be comparatively narrow and completely erratic.

The strongest forecast language the weatherman can use in connection with tornadoes, even though he feels that one is impending, is "severe thunderstorms." When those two words appear in the forecast, weather-wise people know it is time to be wary.

Not that the Weather Bureau is leaving citizens in tornado territory completely unprotected. For several years, now, weathermen have been experimenting with an intensive tornado warning system, whereby alerts and alarms can be sent out as much as 30 minutes ahead of the "twister." On the basis of these, utility companies can cut off gas and electricity in threatened areas, thereby reducing the chances of fire and loss of life due to explosions or live wires.

After the tornado is over, investigators are sent out to check on damage, collect data, and learn what (if anything) might have been done in advance to cut down property damage and loss of life.

In investigating the tornado that formed near White Deer, Texas, April 9, 1947, traveled a total of 220 miles across the Panhandle and northwest Oklahoma and finally dissipated near St. Leo, Kansas, weathermen reported as follows: The twister cut a swath between 1.5 and 1.8 miles wide, moved at a speed of 40 miles an hour, and had a wind velocity of 450 miles a hour at a point 0.2 mile to the right of its center. In the few hours it existed, that tornado succeeded in causing 160 fatalities, an additional 1000 injuries, and property damage estimated at $10,000,000.

On a bet, Pecos Bill, who is the cowboy Paul Bunyan, once rode a tornado over three states. It was this storm that blew all the trees off the Panhandle, but it could not unseat Pecos Bill. Finally, it just gave up and rained out from under him.

But why not forecast a tornado, if there are indications that one is likely to form? Such a forecast, reply the weathermen, would cause more panic than it would do good. After all, what can most humans do in the face of a twister? It is the same as the case where a Texas lady phoned the weatherman and upbraided him for not forecasting the hailstorm that

PHOTOGRAPH COURTESY OF EL PASO CHAMBER OF COMMERCE

Cactus plants of assorted species cover the dry hillsides in the El Paso-Southwest desert area, providing Texas another contrast in its landscape.

PHOTOGRAPH COURTESY FORT WORTH CHAMBER OF COMMERCE

Many cattle graze on the wide-open stretches of the ranges of Texas, which provide all sorts of weather and often on a moment's notice.

poured great pellets of ice and damaged her roof.

"But I did forecast thunderstorms, and they frequently mean hail," the meteorologist replied. "And besides, lady, even if I had predicted hail, what would you have done about your roof?"

"I never thought of that! Good-by."

And the lady hung up.

The third type of storms that do great damage are the excessive rains that fall on Texas, owing to the state's position between mountains and high plateau territory to the north and northwest, and the warm Gulf areas on the southeast. Some of those rainstorms outdo the traditional tropical downpours. One occurring at Taylor, Texas, September 9 and 10, 1921, emptied 23.11 inches of rain from the skies during a 24-hour period.

If Texas temperature shows its greatest differences north and south, Texas rainfall varies east and west. Bon Weir, on the Texas-Louisiana border, has a mean annual rainfall of 53.13 inches, while some 773 miles away on the other side of the state, at Socorro in El Paso County, the annual precipitation averages 8.02 inches.

Heavy rainfall in certain areas frequently results in floods of some duration, or in temporary but destructive "flash floods." For that reason, Texas weathermen keep an eye on the rivers, too, and issue flood warnings whenever they are needed. Flash floods can come and go rapidly. The Trinity River, for example, at one point advanced far above and then receded far below the flood level three different times within a 30-day period covering parts of December, 1947, and January, 1948.

On the other hand, tourists who cross the state during a summer dry spell wonder whether it ever rains in Texas. A favorite story tells of a motorist who stopped for gasoline in a dry area and remarked, "It looks like rain."

"I sure hope so," the filling station operator is said to have answered. "Not so much for me as for my 20-year-old son. I've seen rain."

Unfortunately, Weather Bureau records extending back for half a century knock the stilts out from under that tall story. Summer dry spells notwithstanding, there is no such rainless place in Texas. Taken as a whole, the state has an average yearly rainfall of 30.25 inches. In the 60-year period between 1886 and 1946, 1919 was the wettest year, with an average total of 45.64 inches, and 1917 was the driest, with only 16.21 inches.

Texas has an extensive system of rivers and only five, the Rio Grande and its main tributary the Pecos, the Canadian, Brazos and Colorado, have their sources outside the state. All other rivers by which Texas is drained, rise within the state's borders.

Actually, there are 14 river districts within the five-state region controlled by the weather office at Fort Worth. Headquarters of some of these Texas river districts are located outside the state—a fact not generally known, otherwise Texans probably would do something about it.

So far as extremes of temperature are concerned, Texas has them, also. Actually, no part of the state is free from occasional periods of excessive heat when temperatures go sizzling above the 100-degree mark. At the other end of the thermometer, no part of the state has complete immunity from freezing weather, when the mercury drops to 32°, or even falls below zero. In the Rio Grande valley, the annual mean temperature is 74°, while up north in the Panhandle it averages 54°. Highest temperature ever recorded in the state was 120°, while the lowest was 23° below zero.

Winter in the high plains of northwest Texas means snow, the maximum being about two feet annually. Amarillo reports an average of 20.8 inches and Vega, a few miles west, reports 24.2. Incidentally, it is said that Texans in Amarillo go to Alaska in the winter to get warm.

It is from the Panhandle region that the so-called "Blue Northers" roll majestically and chillingly across the rest of the state. These are severe cold spells, usually heralded by a solid blue-black wall of cloud to the north. Bringing with them freezing winds and rain, the northers move slowly but relentlessly from their point of origin in a (Continued on page 552)

Litchi, Chinese-American

By JOHN M. GREGORY

Branch of a litchi tree showing the grafts wrapped in moss and bound with plastic to retain the moisture and promote the growth of seedlings.

A BEAUTIFUL flower and an attractive and edible fruit are products of the lovely Chinese litchi tree, growth of which in this country has, after sixty years, proved commercially profitable.

The litchi of China, known to botany as *Litchi chinensis,* is a member of the Sapindaceae, or soapberry family. This tree has been domesticated and improved by the Chinese through the centuries, so that there are now several named varieties. The first of many monographs about it was written by Ts'ai Hsing of Fukien Province in 1059 A.D., in what is thought to be the oldest horticultural monograph in existence.

The Chinese consider the litchi to be one of their prized species of plants—the world's finest gift fruit. Its fresh fruit is widely consumed by natives living in the area of its growth, and is regarded highly as a delicacy. Packed in decorated bamboo baskets, the fruit is shipped to coastal markets in the north, where it is in great demand despite high prices for transport.

Emigrant Chinese to the South Seas area use large quantities of litchis. Dried, and called "Chinese nuts," the fruit is shipped throughout the world in decorated, pound-size, paper baskets. It is served in Chinese restaurants. Recently, its pulpy interior canned in sugar syrup, the fruit has met increased demand.

The cultivated litchi tree grows to a height of thirty to forty feet, with a low head that is fifteen to thirty feet broad, and with a short, stocky trunk. When mature, the trunk reaches a diameter of three to four feet. The bark is smooth, the wood brownish-red, heavy and close-grained, taking a fine polish.

The foliage of this tree, for the greater part of the year, is deep-green and laurel-like. New growth in winter or spring is a beautiful orange. The flowers are small but numerous, formed in terminal panicles.

Fruit of the litchi is ovate or oval, about one to one-and-a-half inches in diameter, with a thin, leathery, deep-rose skin that becomes brown and brittle when dried. Within this is the edible part, a delicious, sub-acid, translucent aril, which covers the seed and is usually white, light yellow or, in some varieties, inclined to pink.

The flavor and texture of the litchi fruit have been described as midway between the juicy sweetness of a highly cultivated grape and the sub-acidity of a cherry. Some varieties have a delicate, rose-scented fragrance. Dried, the fruit suggests the taste of a large dried raisin.

The usual habitat of the tree in China is along water courses in sub-tropical regions. It thrives best at low altitudes, where heavy frosts do not occur. The plant is one of the few cultivated fruits known as an ecotype, or one that adapts its organism to its environment. In winter it stores nutrient materials necessary to produce its sweet fruits. While it grows under non-winter-chill conditions near the tropics, it refuses to bear fruit.

Litchi trees were grown in Sanford, Florida, in 1883, and in Oviedo in 1888. The U. S. Department of Agriculture showed much interest when the trees were introduced, but finally concluded that the tree was not adapted to growth in Florida. Despite this, the Rev. W. N. Brewster, former Methodist missionary of Hing-Hu-Fu, Fukien, China, convinced of the possibilities of the fruit in Florida, imported living trees at his own expense. These were confiscated in San Francisco by quarantine regulations and sent to Washington. Later they were propagated in government nurseries, and distributed in Florida. Grown there, the trees were sent to various Florida orchardists, to California, and to other countries. The most successful litchi now grown in Florida is the Brewster, in honor of the missionary. It comes from the most

The graft wrapped with wet moss just before the sheet of plastic is wrapped about it.

northern limit of the tree's growth in China, and withstands light frost.

Successful growth of bearing litchis in this country was finally accomplished by Col. William R. Grove of Laurel, Florida. Retiring, after twenty-one years as an officer in the Army, with much time spent in the Philippine Islands and China, he sought first to learn the commercial possibilities for sale of the fruit.

Investigation indicated demand among Chinese residents of this country, and among Westerners who had lived in China.

In Florida alone, Col. Grove found a demand that would use all the litchi fruit that can be produced in the next twenty-five years. Tests conducted by frozen food experts showed that it freezes exceptionally well, retaining its fresh, cooling sweetness.

Commercial possibilities were also found in the sale of trees for yards, parks, and avenue planting, because of the symmetry of the tree, beauty of its foliage, and large clusters of red, grape-like fruit that hang in early summer from the tips of the branches.

Test trees were planted in a grove at Laurel, Florida, in 1940. Plants were sent to about fifty other locations, from Orlando to Homestead. The trees thrived, producing as much as two hundred pounds to the tree, and surviving as much cold as the average citrus trees.

Usually from three to five years are required for layered or grafted trees to bear fruit, while seedlings may require as much as nine years. The tree reaches its prime at between twenty and forty years, and may bear fruit for more than one hundred years.

Most litchi trees in China are propagated by the "pok chih", or gootee method, a process called in this country air-layering. Under appropriate soil and moisture conditions, Chinese cut the bark from a small section of the limb at a point where new roots are to be formed, usually below a node or leaf-bud.

Soil is wrapped around the cut, and tied in place with binding mud made of wet, sticky pond or canal earth and chopped straw. On dry days this soil has to be watered. When young roots show through the wrappings, the limb is cut off back of the roots, kept in a dark place for two or three weeks, then gradually exposed to full light. This method has been used for centuries.

Col. Grove improved the method by wrapping the cut with sphagnum moss, or other rooting material, binding it in a sheet of rubber plastic, and tying both ends with rubber bands. No watering or care is given. When roots show through the plastic, the wrapping is removed and the new tree is planted or potted. Grove used his improvement on more than 10,000 litchi trees one year with uniform success.

George Weidman Groff, former professor of horticulture and director of agricultural work at Christian College, Canton, China, and recognized authority on the litchi tree, also feels that the commercial possibilities of the litchi tree and fruit are vast in this country. Grove sold all fresh litchi fruit produced in 1946 for one dollar a pound wholesale, some for one dollar and a quarter. Some trees produced as much as two hundred pounds each; two, more than three hundred pounds.

"Small orchards are now being planted in various sections of south Florida," Col. Grove says, "and from these small beginnings the industry will develop. We ship fresh fruit to many states, and young trees all over south Florida to individuals and companies, and to California for experimental purposes. Litchis have passed the experimental stage in Florida."

Professor Groff feels that Col. Grove has demonstrated the tree's possibilities in Florida, if it is planted in suitable areas, and protected by heat during short periods of winter freeze. Asked if he thought the fruit would appeal to the average American, he said it undoubtedly would, and quoted the famous Chinese poet, Su Shih, who, in 1094, was banished to south China for having offended the emperor, and there wrote:

"Beneath these green mountains where spring rules
the year,
The yangmui and loquat in season appear;
And feasting on litchi, three hundred a day,
I shouldn't mind staying eternally here."

"If this great Chinese poet thought so well of the fruit that he penned this praise despite his banishment, it is not difficult to predict the effect it will have on many of us," Professor Groff declares.

Two Little Christmas Bears

By ELLSWORTH JAEGER

THIS is an unheard of thing, for little bears always come long after Christmas, and are very little fellows indeed, even in the spring, when they first emerge with their mothers from their winter dens. But anything can happen at Christmas time, when magic, shining trees gleam in every home and Santa Claus and his reindeer leap from roof to roof, and the jolly visitor slides down chimneys, especially the chimneys on houses where little boys and girls live.

However, this story is not about houses or chimneys of little white boys or girls, snug and warm in their downy beds. Our tale concerns a little Indian boy and girl on Christmas Eve. They lived in a birch-bark wigwam deep in the heart of a snowy spruce forest. They lived with their old, old grandfather, for their father was in the Canadian army fighting far away in the great war, and the Great Spirit had taken their mother on the long trail to the dancing fires in the northern sky. And so they lived in the lodge of their grandfather, waiting until the day when their father would return from the war trail.

Grandfather was old and wise and had traveled everywhere in the great woods, even as far as the wondrous trading posts, where strange white men gave candy, soft scarlet blankets and all manner of good things for the furry coats of foxes and minks and beavers that the Indians had caught.

This night was "the Night of the Shinning Tree," as the Indian grandfather called it. Many years before, when grandfather was a young man, he had snowshoed to a trading post on this night. When he entered the trade room, he was amazed to see that everyone was dressed in his best woods finery. Everyone wore his most beautiful parka, or a brightly colored blanket coat, bound with brilliant sashes. Fiddles and accordions were making merry music and everyone danced and sang and was joyful.

And then grandfather saw a wondrous sight. In the corner was a large spruce tree. But this was no ordinary spruce, for it gleamed and twinkled and glistened with a hundred little lights. Instead of spruce cones, it had countless red and blue, golden and silver fruits, magic fruits he had never seen on any tree in the forest. It was indeed a magic tree, for beneath were piled presents for everyone. He had remembered this magic tree, and this night, all his life, and each year, when the 24th sun of the Long Night Moon—as the Indians call Christmas Eve—came around, his mind would go back to this happy night of long ago and its shining tree, and so he called it his "Night of the Shining Tree".

This Christmas Eve, as the embers of the lodge fire glowed red and warm, and the little Indian boy and girl lay snug in their rabbit-skin blankets, sniffing the incense of their balsam beds, grandfather told them the story of his night of the shining tree. He told them of the gaiety, the music, the bright colors of the Indians' and the trappers' clothes, saving for the very last his story of the wonder and beauty of this gleaming, magic tree.

And when he had finished his tale, they looked at him with big, wondering eyes and asked, "Grandfather, do you think that we shall have a magic tree and gifts this night?"

Grandfather looked old and sad for a moment, and then happiness came into his eyes and he said, "Yes, my children. You shall have a shining tree this night, and perhaps its magic will bring you gifts as well. But close your eyes so that sleep will come, and while you slumber, strange magic will be done."

After a long time, the little Indian boy and girl finally slept. While they slumbered, dreaming of strange and wonderful things, grandfather busied himself. He went out of the lodge into the snowy forest bright with starlight and cut a small spruce tree that would fit inside the lodge. This he brought inside, thrusting the butt end into the ground at the back of the lodge.

He then rummaged here and there in his duffel bags, finding a small beaded pouch, gay ribbons, a bear-claw necklace. These (Continued on page 545)

Angel's Trumpet

By SOPHIE VAN HOESEN

CLOSE relative of the odorous jimson weed, frequenter of rubbish heaps, is a cultivated favorite of *Datura*, commonly called "Angel's Trumpet". Early admired about 1895 by an orchid collector of the U. S. Nursery Company, who found it in South America, the species was introduced into the United States and widely distributed in double blossom varieties of "yellow, white, blue, and deep carmine." Cultivated for its trumpet-like blooms, it has been seen in such widely separated areas as the Canadian side of Niagara Falls Park; Rockport, Massachusetts; St. Petersburg, Florida, and in many old gardens in Louisiana and southern California. In Canada and other northern regions the woody species may be grown outdoors in the summer and stored in the basement through the winter. Dr. John Dearness, Canadian scholar and botanist, followed this procedure and was rewarded with several lovely trumpet blooms the next spring.

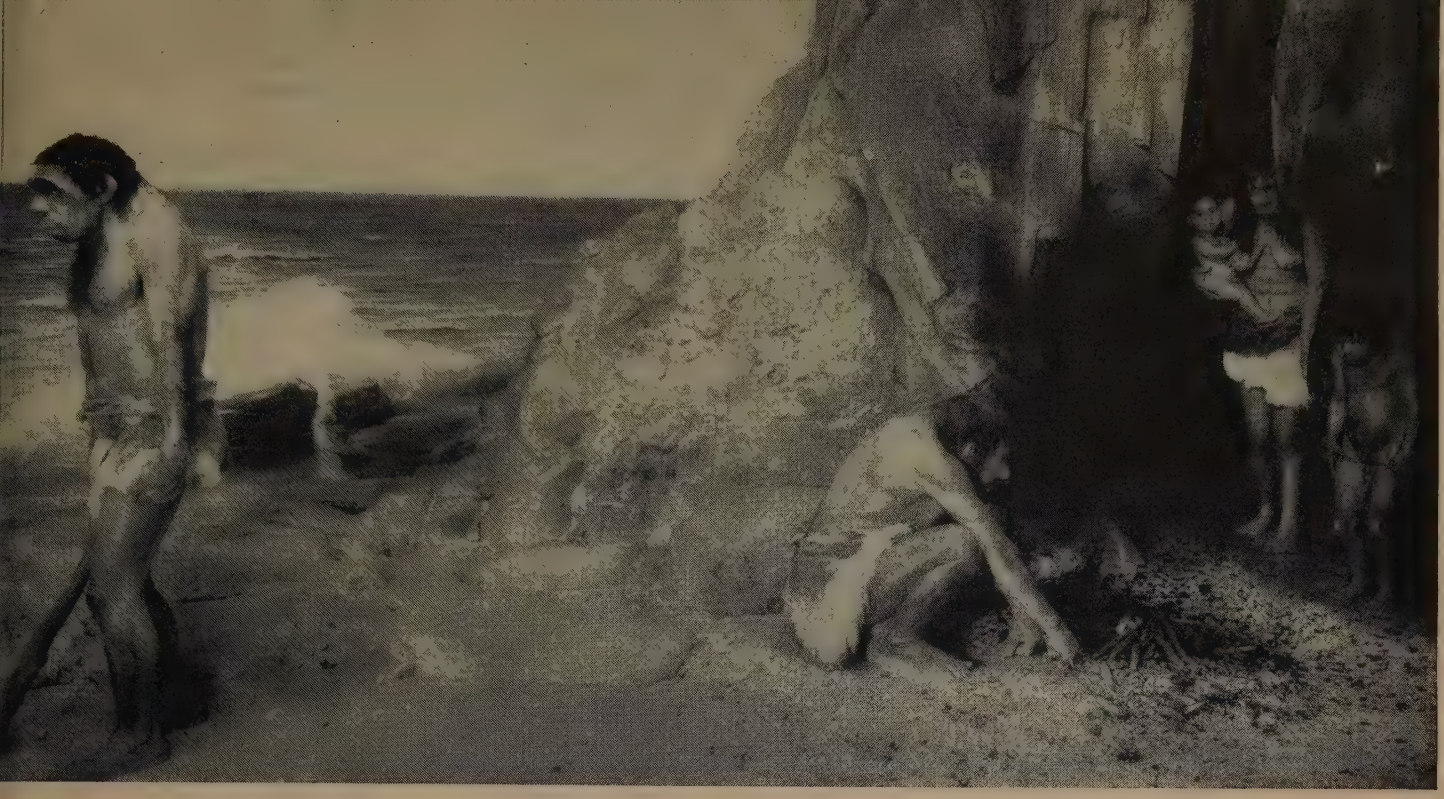
COURTESY BERKELEY GAZETTE

Bob Taylor and Bonnie Jane Gordon admire the blooms of the Datura, or Angel's Trumpet, that grows in the gardens of the Hotel Claremont, Berkeley, California. Inset is a closeup of a bloom.

The plant itself is large, fast-growing, and easily raised. One, grown from a single shoot planted some forty years ago in the Vedanta Gardens, Berkeley, California, is now between twelve and fourteen feet tall, supported by a trunk that is one foot thick at the base. Trimmed once—sometimes twice—a year, it is almost everblooming in southern California, only noticeably barren of "trumpets" the latter part of December, or when the weather is cool. In this area it is known as *Datura arborea*, but most of the plants cultivated under this name are thought to be *Datura suaveolens*. The extent to which the true *arborea* is cultivated is unknown.

A technical description of the "Angel's Trumpet" falls short of expressing the beauty of these flowers. The blooms are usually double, a common occurrence in many of the numerous species of *Datura*. White is the prevailing color, rarely red or yellow, and the flowers may either grow erect or hang pendulum fashion from the tree.

In addition to the peculiar smell, all the species contain strong narcotics, which are medicinal in small doses but poisonous in large amounts. The fruit of the Jamestown weed, corrupted into jimson weed, or thorn-apple, was sampled in 1607 during the settlement of the first permanent colony in America at Jamestown, Virginia. Whether birds alighting on these enlarged plants will become narcotic fiends is undetermined, but admiration of the beauty and grace of the "Angel's Trumpet" cannot be stifled because of narcotic content or displeasing aroma.



Neanderthal man and his family as restored in the habitat group at the Chicago Natural History Museum by its anthropologists and the artist, Frederick Blaschke.

Nature's Model-T Man

By EDWIN D. NEFF

This is the second of three articles, bringing up to date, in popular terms, what we now know of prehistoric man.

FROM sunny Naples, the other day, came a strange story by the Associated Press. It blew across newspaper pages the world around like a damp wind from the long ago. Human beings, the story said, were still living in caves—driven there by bombs during the last war, and now afraid to leave. They had come to prefer the dark, dank hillside caverns to the bright, busy streets of the city. They had even borne children in the caves and set up a kind of community life. Little people who live in the dark, the story called them. Could this be prologue?

Let us recall that not so very long after the atom bombs exploded—the first ones—the Army Map Service in Washington, D. C., asked a committee of experts to look around for bomb-proof caves—shelters for human beings cowering before the terrible atom. Unlike Europe, this country has but few livable caverns, but the Army has decided those we have could protect scientific documents and war materials. And who can say but what man himself may not take to the caves in many parts of the world if the big bombs come again, and he finds his cities gone?

Homo sapiens, it seems, is about to complete the great circle in which he has been running for 50,000 years. So let us glance back over those 500 centuries to the first men who took to the caves, the low-browed, bull-necked, barrel-chested Neanderthals, sometimes called Darwin's first witnesses.

Neanderthal man is a mighty challenge to a scientific Pinkerton. Even today, mystery enshrouds his origin and his fate. He has left his clues—either implements or serried skeletal remains—from Gibraltar to Peiping. Krapina, Teshik-Tash, Irkutsk, Ordos, Mt. Carmel, Spy, Dusseldorf, Weimar, Ehringsdorf, La Chapelle-aux-Saints, La Naulette, Le Moustier, La Quina, Pech de l'Aze, Sipka—these are some of the weird and wonderful place-names where Neanderthal traces have been turned up, sometimes by ignorant workmen, sometimes by learned anthropologists, sweating, digging, hoping.

How could one trace the origins of so widely scattered a people? How would one know where and how he made his last hopeless stand against modern men, finally to vanish forever?

Even the master anatomist, Dr. Rudolf Virchow, was fooled by a Neanderthal skull. He thought the startling differences from modern man were the results of disease! Little wonder the workmen who

found the skull that tricked Virchow never supposed it belonged to a human, not altogether different from themselves. They tossed the macabre relic, and the few bones nearby, outside the cave where they were quarrying limestone.

Again, we must remember that on that humid August day in 1856, when the greatest single find in physical anthropology lay in the brutal shovels of laborers, no one knew such a man as Neanderthal ever existed. This was in the valley of the Neander stream, near Dusseldorf, Germany, and from that fact came the name, Neanderthal. But the bones of the same men had been found as early as 1700, and, just eight years before the namesake finds, a "Neanderthal" skull had been uncovered in a quarry at Gibraltar. No one recognized them.

And so the whole heart of anthropology must go out to the Neander quarry owner, who ordered his careless workmen to turn their finds over to scientists. But, alas, the scientists were too ignorant then to cope with the shifty Neanderthal. We have seen the great Virchow's decision. Another learned man said the Neanderthal skull, with its low, sloping forehead, its tremendous round eye-sockets, and thundering brow-ridges, must have belonged to an idiot. Fortunately, other scientists—Schaaffhausen and Broca among them—recognized the Neanderthal cranium as not a monstrosity, but a peculiar and hitherto unrecognized form of man. What they did not know was his appalling age.

That disclosure, filling in another chink in the Neanderthal mystery, came in 1886 with the excavation of two skeletons near Spy, Belgium. With the skeletons were flint implements and fossil remains of the huge mammoth, woolly rhino, cave bear and other extinct animals. These were "cold fauna." They were known to have lived in the period of the last glaciation, when Europe shivered in the grasp of the Great Cold. That was 50,000 years or more ago.

Still other Neanderthal finds came in as the years passed—his fossilized skeletal remains, the flint tools with which he worked and killed, the bones of his animal prey, little burial groups of families, nearly always associated with caves. From these scattered finds, much can be told about Neanderthal men.

Here, for example, is a typical skull. Note the long, low brain-case; the immense brow ridges; the retreating forehead; the face long and thrust down and forward, the long, broad nose, powerful jaws and rudimentary chin—at once the shadow of an ape; the substance of a man! Notice also the skeleton. Thigh bones strongly bowed foreward as in apes, short and massive. The arm bones medium in length, but thick and heavy to serve big muscles. The whole frame suggests a short heavily built fellow with an outsized head, who walked with a strange, bent-knee shuffle.

COURTESY SMITHSONIAN INSTITUTION

Three-quarters view of the McGregor restoration of the Neanderthal skull from La Chapelle-aux-Saints.

Partially to sum it up, there are the caves, the woolly animals adapted to the ice-age, the flint tools, the family burial groups and the story told by the bones themselves, which give us Neanderthal man's physique and his particular rung on the ladder of evolution.

While earlier men—Sinanthropus, or Pekin man in China—used caves, Neanderthal men were the first to live in them. They had to. Where else could they find shelter against the awful cold? Dr. Henry Field, formerly curator of physical anthropology, Chicago Museum, calls Neanderthal man "probably the first to seize a woman and protect her from animals and other men." Neanderthal men began family life in the world of men—truly epochal, for earlier men lived in herds, like the animals they hunted.

And now his tools. They are mostly of chipped flint, crude, unartistic. Some writers sneer at Neanderthal, saying he lived 50,000 years without an important invention, or a great discovery. This overlooks the chief fact in Neanderthal man's existence. His struggle was simply and wholly to live. His great enemy, cold, never left him. The great mammals cast shadows of death on the icy plains outside his caves. And time itself was another enemy. There was no time to invent, to discover. The immense discovery that plants grow from seeds had not come to men. There were no annual harvests to provide leisure. Neanderthal needed nearly all his time to pursue wild animals. One anthropologist calls him "a successful hunter, courageously maintaining his existence amid a crowd of competing beasts of prey."

Yet, Dr. Field notes, Neanderthal man's tools show measurable improvement in design over those of preceding periods. Flint knives, scrapers and points could have been used for scraping animal skins for clothes. And at La Quina, France, little balls of limestone, plainly shaped by the hands of men, were discovered. Dr. Field and others believe they might have been

used as bolas, the weapons with which the Gauchos of South America today entangle the limbs of animals. But a close analysis—not possible here—of Neanderthal man's labored improvements in tool and weapon making, shows, to be sure, he was not truly an inventor.

His improvements are, rather, the slow evolution of a culture on strictly practical lines. There are no sharp departures from the orthodox flint techniques. Even for this creaking progress, he had to fight for time. Probably he knew that meat would last a few days longer if packed in ice. And those few days could be spent trying to figure out why one kind of flint point killed more surely than another. A few days for so great a problem, then back to the hunt.

Perhaps Neanderthal even found time to wonder about what would happen to him when he died. For, in 1908, a human skeleton was excavated, deep underneath the floor of a rock shelter at Le Moustier, France, in circumstances that seem to show some thought

Site of the cave at Le Moustier, Dordogne, France, where Neanderthal finds established a type station of the Mousterian period.

COURTESY SMITHSONIAN INSTITUTION

of a life after death. Sir Arthur Keith, the British anthropologist, describes the scene:

". . . Surrounded by a company of German anthropologists . . . the skeleton was finally extracted . . . with expert eyes looking on to bear witness to its authenticity and antiquity. The skeleton was that of a lad of perhaps sixteen . . . his canine teeth and third molars were not fully erupted; the growth lines of the long bones were unclosed. There could be no question; he had been deliberately buried . . . typical implements . . . were nearby. Charred remains of the ancient ox . . . were noted. The body had been lain on its right side, with the face turned down, and a pillow of stones placed under the head."

The tools, so carefully laid in the grave, doubtless were for use in a future hunting ground, while the ox meat would stay the lad on his journey.

Incidentally, it was from the tools found at Le Moustier that Neanderthal's entire flint industry takes its name—Mousterian. The French, hating the Germans, refuse to call the tools Neanderthalian. And again, incidentally, the skeleton found at Le Moustier was stolen by a German anthropologist just before the first World War, and smuggled across the German border to Berlin, in a coffin. This is man some 50,000 years after Neanderthal!

But to return to the caves, certainly those miserable tenements of Nature were not Utopia. Crowded, unsanitary, cold and drafty, Neanderthal man's caverns must have taken a terrible toll, especially among his children. He seems to have denied himself even the comfort of the more protected rear sections of the caverns, for his remains are nearly always found at the entrances. No doubt, had he left these unguarded, he would have found himself arguing with wild beasts over ownership of the caves. But at least this desperate existence kept Neanderthal man's racial endurance high by weeding out the weak and unfit.

And Neanderthal was a mighty hunter. How contemptible our city-outfitted "sportsmen" would seem to him. "Sportsmen" who need high-powered rifles to knock over deer at good, safe distances. Neanderthal killed to eat, and hunting took courage in those days. His short legs made him ridiculous in a chase. His flint implements could not kill at a distance, and he had no bow and arrows. His spears were effective against small game, but the mammoths presented three inches of fat, an inch of skin, a coat of wool and a coat of hair. They had to be outwitted, trapped or maneuvered into falling off a cliff. Only when trapped or maimed by a fall could they be killed.

So here we have a strange and wonderful man—yet not quite a man. Not quite *Homo sapiens*, and surely not an ape. Where does he fit into the gap-toothed story of evolution? Nearly 100 years of scholarly debate have not settled that question.

For a long time anthropologists believed Neanderthal men vanished without leaving so much as a thumbprint on the brow of *Homo sapiens*. He seemed a completely separate race from modern men. He may have been wiped out, the scholars said, by malaria, yellow fever, or flu, or by the swifter, smarter Cro-Magnon men who succeeded him in Europe.

Then came two startling discoveries in Palestine that seemed to banish the old speculations. In two nearby caves, both on a flank of Mt. Carmel, two quite different types of human fossil remains turned up. The first find was by Professor Dorothy Garrod of the British School of Archaeology, at Mugharet et-Tabun, or Cave of the Oven. This was a nearly complete skeleton, a huge lower jawbone, and a variety

of bone fragments and teeth. These were proved to be a primitive Neanderthal type. Now came discovery by Dr. Theodore D. McCown, American School of Prehistoric Research, of remains of ten or more individuals at Mugharet es-Skhul, or Cave of the Kids. These individuals were proven to be more advanced than classic Neanderthal men, yet with Neanderthaloid traces.

Further, fossilized animal remains at both caves showed the Skhul and Tabun peoples lived at about the same time, and that time stretched back to a period just before the last ice-age when the very earliest Neanderthal men are believed to have appeared in Europe.

There is not, it now seems, a clean break between Neanderthal men and *sapiens*. Keith and McCown believe Skhul man, for all his Neanderthaloid traces, may have a place "among the ancestors of modern races," and the late Dr. Franz Weidenreich of the American Museum of Natural History said "the group of Skhul skulls perfectly fit in between the classic Neanderthalians of Europe and the general type of *Homo sapiens*." Were they, in a way, "missing links."

Dr. Weidenreich went further. He selected a group of skulls, including only one from Skhul, and, by careful anatomical analysis, found they were all intermediate between classic Neanderthal men and *Homo sapiens*. Yet he showed by geological evidence they were all older than classic Neanderthal men, even though a notch higher on the evolutionary ladder. The Mt. Carmel finds, then, are not the only ones to be ranged between Neanderthal men and modern men by science.

And so the mystery of Neanderthal. Was he a direct ancestor of modern men? We cannot say so, for more progressive men—anatomically speaking—lived before him. At Mt. Carmel, the classic Neanderthal man seems to have mixed, to have crossed, with a more progressive type. Perhaps *Homo sapiens* passed through a Neanderthal phase, although not in Europe.

Dr. Montague Cobb, professor of anatomy at Howard University Medical School in Washington, D. C., puts it nicely: "There were Model-T men and Model-A men on the road at the same time!"

Resting Place

By F. SCOTT AVERY

A little knoll of velvet grass, beside a purling brook,
Hard by a shimmering pool of glass, within a shady nook.
While lying here on earth's sweet breast in transports of delight,
Come joyous and repeated thrills at every sound and sight.

So hazily the tracery of Nature's filmy face
Spreads lazily and gracefully throughout this fairy place;
And dreamily and wearily, fanned by sweet zephyrs cool,
The lacy leaves are nodding at the minnows in the pool.

Now liltingly, through willow trees, down in this little dell
How listlessly sweet melodies so gently rise and swell
From every form of Nature in these vibrant precincts dear,
And go floating up to heaven, which seems divinely near.

When, glintingly, the sunny rays, piercing the canopy,
Dance brilliantly, like chrysoprase in jewelled panoply,
The twittering birds, the butterflies, and softly droning bees
All sense the soothing solace of such solitudes as these.

Quite restfully and blissfully, I'd lie beneath this mound,
When finally, resignedly, my days have ceased their round;
Forever here would willows mourn and weep above my bier,
And dew-teared eyes of buttercups would glisten ever near.

So, tenderly, rememberingly, consign herein my clay,
And feelingly, rem'niscently, just smile a tear away;
A daisy wreath, all ready-grown, would live above my brow,
And I would sleep through endless time, beneath a sighing bough.

Christmas Plants

By E. LAURENCE PALMER

PARTRIDGE-BERRY

BITTERSWEET

SPHAGNUM

CLUB MOSS

This is the fifty-second in NATURE MAGAZINE'S *series of educational inserts.*

Illustrated by Heinz Meng

THE Christmas holidays are marked by a bustle of activities in the stores, by seasonal music over the radio, by accelerated excitement on the part of the youngsters, by united effort of the whole family to make the home more attractive than usual. Christmas is also a time when certain plants appear in decorative arrangements on doors, in windows, on window-sills, about the room and even in massed arrangements in the busier parts of the smaller cities. All of this, if carried on reasonably, may be entirely worthy, but if a temporary isolated beauty is attained through permanent injury to any plants having a sustained appeal to all, then it may not be justified. Much injury to the natural beauties of our environment is caused by thoughtlessness on the part of worthy citizens. Possibly this insert may make it possible for more people to enjoy more beautiful things in Nature longer than before. If so, it will have served its purpose.

The twenty-seventh of this series of special inserts gave considerable attention to the evergreen trees commonly used for Christmas trees. This unit adds to the list there presented, and deals with many of the smaller plants that appear in wreaths, pots, balls, garlands, festoons, ropes and vases about the time "Silent Night" and "A White Christmas" crowd less worthy musical numbers from the radio programs. Some of these plants have striking color. Some produce exceptional fragrance. Others have legendary significance, unique form, traditional approval or local abundance that warrant their use at particular times and places. Commercial dealers, through advertising and other means have built an artificial popularity for certain species that may be inferior in many ways to less well publicized forms. No doubt some families let the price mark on some floral decorations be accepted as a satisfactory measure of their relative beauty. This, of course, is absurd. Blind patronage may easily encourage the avarice of individuals and groups who through selfish motives will despoil a neighborhood of some of its choicest natural beauty. This is not good. Fundamentally, there is more value in a wreath made by the family group from materials available in abundance, and collected without injury to the source of supply, than in any wreath at any price in the swankiest supply house. The making of such a wreath may demand courteous cooperation of land owner and visitor, physical effort on the part of the young and vigorous members of the family, and artistic skill of those best qualified to make such a contribution.

The eighteen plants selected for special consideration here are chosen to represent various uses. With a few Christmas tree species we have presented holly, mistletoe, and mountain laurel, which find places for themselves as decorations for doors, chandeliers and lamp posts; club mosses, bittersweet, and ground pine, which are usually made up into more or less formal wreaths; bayberry, which makes a permanent and attractive filler for a vase, or is processed into unique bayberry candles; partridge berry and wintergreen, which appear in terraria and in table settings; and poinsettia, Christmas cactus and the like, which are commonly at their best in pots that come from the florist.

Hints on Collecting Christmas Plants. Many of the potted plants that are purchased outright from the florists are inadequate to meet the wishes of the average family for Christmas green decoration. It is fun to collect something on your own, but there are proprieties and responsibilities associated with such collection that thoughtless persons may fail to recognize.

In the first place, there is no justification for making collections to celebrate the season of good cheer by taking something that belongs to someone else. Therefore, one of the first steps in collecting plants from the wild is to be sure that what you do has the approval of the owner of the property you take. This is just as true if the owner is the state or community as it is if the owner is an obstreperous old man with a shot gun.

Whether you have approval or not, your collections should be so made as to cause a minimum of injury to anything. If you must collect trees, collect first those the removal of which may improve the lot of adjacent trees needing more room for development. Do not climb a fine tree just to get its top, and, in doing so, ruin the form of the tree for the rest of its life. Instead of pulling the long runners of club mosses or ground pine, come supplied with clippers so that you can cut off the surplus you are to take without injuring the main plant. If you wish some small branches for scattering about the table or room, take them from parts of the tree where their removal will not injure the shape of the tree, or reduce its leaf surface to a dangerous point.

BURNING BUSH

SPANISH MOSS

BLACK ALDER

CALIFORNIA PEPPER

HOLLY

Above all, your collecting activities should be regulated by the abundance of the material still available when you are through. It is wholly out of keeping with the Christmas spirit to be the collector of the last surviving black alder, or bittersweet, or Christmas fern in your neighborhood. Unless there is an overwhelming abundance of the material that interests you, the safest thing to do is to leave it where it is, and where it is likely for a longer time to be attractive and useful.

Study the behavior of woody plants before beginning to rip them and tear them to pieces. Notice how *judicious* pruning of such trees as white cedar may actually improve the appearance of the plant by increasing the number of smaller branches. Trimmings, properly made, may help you and the living plant that is left when you are through.

Be careful not to rip and tear any living plant. Remember that the bark of some attractive evergreen trees is tough, and if you attempt to tear off branches you will also tear off great strips of bark needlessly.

Learn to substitute species that are abundant for rare forms in making your collections, and, to help in this, deliberately train yourself to appreciate the beautiful in the commonplace.

Make your collections near enough to the time they are to be used so that they will appear attractive and fresh when you wish them to be so. Store them in a suitably cool, moist place if they must be kept for some time, and supply them with water if this will help in their preservation or extend their period of usefulness.

Be sure, when you are about to make a collection, that what you make of the collected material will be of more use than the material would be if left alone. Check over the usefulness of the plant as a unit of erosion control, as cover and food for bird and mammal life, as potential lumber or fuel, or as a thing of beauty, before you touch a plant. After you have checked its value in terms of its usefulness to you, then check its probable value in terms of its usefulness to others. Only when your conscience and your reason tell you that your collections are for the good should you proceed.

Planning Your Decorations. Indoor or out, your Christmas decorations should be planned and appropriate. A few really attractive sprays of holly, bittersweet, black alder, or bayberry, framed or backed by masses of more prosaic white cedar sprays or pine trimmings, may be more effective than a greater abundance of the rarer or more expensive centers of attraction. This is merely to suggest that you plan to make the valuable things go as far as they can.

Color effects may be attained as effectively by the use of ribbon or, even, paper bows against massed evergreen, as can be expected of similar massing of expensive holly. Well-placed electric lights of the Christmas tree type may brighten up what might otherwise be dull and uninteresting. While many writers and planners suggest the use of evergreens around the base of candles, or even wound around the lower portion of candles, it does not seem that the attractiveness thus attained is sufficient to measure against the danger of fire. A properly framed candle flame may be beautiful, but plastic surgery to heal the injuries of burning is expensive and painful, and not the kind of experience one likes to associate with Christmas.

Plan to make your visitors acquainted with the significance of the plants you use for Christmas decoration. Mistletoe is

BAYBERRY

JAPANESE BARBERRY

MOUNTAIN LAUREL

YEW

MISTLETOE

supposed to remove certain inhibitions from those in its vicinity, but how many know of its parasitic habit? Bittersweet is attractive, but how many have seen it strangle a healthy tree, or know that not all plants bear the attractive fruits? We speak of yuletide glibly, but how many know how the season got its name, or why it was the custom to burn yew logs at this season rather than at other times? What do your Christmas guests know about the habits of the holly, and how many can have any appreciation of the interesting life history of the club moss or ground pine that makes up the wreath on your front door? It should not be a disgrace to know something of the plants that are used so freely at the Christmas season, and it might help some of them to survive if we understood them a little better.

Sometimes Christmas greens are shipped in from remote places. On such plants may be insects foreign to the area where they find their ultimate use. A few years ago a student sent in an insect found walking on a New Jersey table cloth. It could have come only from Florida. A little detective work traced the insect to some greens used in the center of the table, and these were traced to a chain store and eventually to Florida. A little information on the probable source of holly, mistletoe, bayberry and laurel may lead to some interesting imaginary trips, if one wishes to appreciate the parts of the country that may have contributed to the Christmas decoration. Some of the plants just mentioned have a normal northern range, while others come from farther south. Offhand, can you make a suitable classification on this basis of the greens you find in your home, or in the homes of neighbors, this season?

What to Do with Christmas Greens. Balls, sprays, wreaths, garlands, boxes and trimmings of various sorts are made of Christmas greens. Here are a few suggestions as to how you may make some of these, if you have the materials and your conscience is clear that they have been collected on a rational basis.

Wreaths are commonly made on frames. A frame may be made by binding two pliable sticks into a circular frame about a foot in diameter. The coarser sticks from which finer materials have been trimmed are usually satisfactory bases for your wreath. A number of short sticks may be used, binding the coarse base of one to the slender tip of another with coarse cord or number 18 wire. A stretched wire coat hanger makes a good frame for a wreath. When the circular frame has been made, the finer materials may be bound to it, fastening the smaller pieces to the frame by binding the newer pieces just behind the ones that are already attached. By putting on a small piece, and giving a single turn with the binding material, the whole task is relatively simple. Ordinarily, the wire used to bind the sprays to the frame is finer than that used to bind the parts of the frame together. Wire number 22 or 24 is suitable for the final binding process.

Graduated wreaths may be made by starting with smaller materials and binding increasingly larger materials for a half of the frame. If similar materials are bound to the remaining portion of the frame, beginning with small materials adjacent to the other small materials, a most attractive wreath will develop. If (continued on page 536)

STAGHORN SUMAC

WINTERGREEN

OREGON GRAPE

POINSETTIA

COMMON NAME SCIENTIFIC NAME	ACUTE-LEAVED SPHAGNUM PEAT-MOSS *Sphagnum capillaceum*	GROUND HEMLOCK *Taxus canadensis*	COMMON CLUB-MOSS *Lycopodium clavatum*	BAYBERRY. WAX MYRTLE *Myrica cerifera*
DESCRIPTION	Commonly found in pure stands, with masses of weak stems supporting one another. With 2 to 3 layers of empty cells without spiral markings clothing the stems. Branches and branchlets come to a fine point and may be conspicuously purplish, red or green. Lower portion of the stem is commonly decayed.	Low shrubs, rarely over 4 feet high, usually sprawling, forming reasonably dense cover, often to the exclusion of other kinds of plants, although in dense shade this may not be so. Leaves: usually under 1 inch long, dark green above and pale green beneath. Twigs: rough, dark, elastic and relatively slender.	Stems run along just beneath the surface of the ground, or at the surface, branching freely and growing to great lengths, rooting at intervals and in older portions becoming buried under accumulated trash. Usual height to about 10 inches. Leaves crowded, about ½ inch long, bristle-tipped, silvery green when new and dark when old.	Tree or shrub to 40 feet high, but usually a low, sprawling shrub forming a dense, stiff, thicket-like area. Leaves narrow and acute, to 3/5-inch wide as contrasted with related *M. carolinensis* whose leaves may be entire and to 1 3/5-inch wide. *M. carolinensis* is true bayberry. Leaves are fragrant.
RELATIONSHIP AND RANGE	Family Sphagnaceae and Order Sphagnales. There are 10 species in North America closely related to this species with some 20 related to *S. cuspidatum*, which has long, narrow, branch leaves that spread and are wavy-margined when dry. Another species of sphagnum was figured and discussed in the forty-third insect.	Family Taxaceae. Common in evergreen woods from Newfoundland to Virginia and west to Manitoba and Iowa, usually in the shade of other and larger woody plants. Only native member of the genus in the territory listed, and only species likely to be found wild there. Related European yew is grown as an ornamental in many parts of the world.	Family Lycopodiaceae. Order Lycopodiales. Found widely distributed over the world. In North America, this species is found in Labrador to North Carolina and west to Washington and Alaska, with closely related species extending the range. Found at high altitudes in the tropics in both hemispheres. Three species already considered in 43rd insert.	Family Myricaceae. Order Myricales. *M. cerifera* is native of swamps and wet acid woodlands from New Jersey to Florida and the West Indies, west to Arkansas and Texas. *M. carolinensis* is native in moist, sandy soils from Nova Scotia to Florida, west to Lake Erie and Louisiana. In New England the common species is *M. carolinensis.*
REPRODUCTION	Male organs usually found on red branches, while the female organs are found on tassel-like branches. The two may be on the same or on separate plants. As in other sphagnums, the stalk of the spore case is gametophytic, while in ordinary mosses this structure is sporophytic. Spore cases are spherical; spores, rusty.	Flowers in small clusters close to the ends of the stems; staminate being globular, and pistillate, consisting of a single, erect, seed-like structure that ripens into a beautiful red, berry-like fruit with a hard, nut-like center but not a true drupe. Fruit ripens about 2 months earlier than that of the European yew.	Spore cases in cylindrical spikes borne on forked branches, which have few and well-separated leaves. Sterile leaves are entire and bristle-tipped, while in *L. annotinum* the leaves lack the long bristles. Spores mature in August and September and freed in great clouds when ripe. Major part of plant is sporophytic rather than gametophytic.	Flowers appear in catkins before or with the leaves, those bearing stamens being cylindrical and those bearing the pistils more or less globular. Fruits of *M. cerifera* are under 1/12-inch in diameter. Fruits of both species, when mature, are covered with a pale blue, aromatic wax that gives the plants their names.
HABITS	Commonly found with pitcher plants, sundews, cranberries, cotton grass and with bog rosemary, cassandra, Labrador tea and many of the most beautiful of the orchids. The sphagnums are able to absorb moisture from humid atmosphere and thus be independent of water from below.	Popular shrub for ground cover in the shade in suitable territory. Holds soil and snow well in winter on steep banks, and provides superior year round shelter for wildlife, although its fruits are not sufficiently abundant to help much on the food supply. Does not grow rapidly and so should be cut reservedly.	Found in open fields or woods, or mixed with grass, commonly on soils too poor or sterile to support other plants. Not commonly found in soils that are limed, but more likely in sands or gravel that support few competitive species. Gametophytic stage is obscure in all of the club mosses, while it is conspicuous in the true mosses.	Wood of *M. cerifera* weighs to 35 pounds per cubic foot, is light brown but has little commercial value. Wax from fruits is removed by boiling and floating off the melted wax, which is then made into candles that burn with a most pleasing fragrance. Myrtle warbler gets its name from its habit of feeding commonly on the fruits of the plant in winter.
ECONOMIC IMPORTANCE	A bog-builder used in making absorbent bandages and for packaging plants for shipment. Dried sphagnum may be used as fuel, and in some parts of the world produces most of the fuel used. In Christmas decorations, the plants may be used in wreaths or as moisture-holding bases for other plants of one form or another.	A jelly may be made of soft, red part of fruit, but the "pit" should not be eaten cooked or raw, as it may have poisonous properties. Foliage is poisonous to horses and to cattle. Related European yew supplied the huge, long-burning logs that were commonly put in the fireplace to burn through the night to celebrate Yuletide.	Used in making Christmas wreaths. Provides excellent soil anchorage where this may be necessary. Cannel coal was formed from the accumulated spores of club mosses. Spores now used in expensive toilet powders, as pill coatings, in flashlight and fireworks powders. Plants make excellent mattresses for campers. Since it is, like other club mosses, exceedingly slow growing, its use should be avoided whenever possible.	In addition to yielding wax for making candles, the plants are used for making, ornaments and for winter bouquets since the fruits persist through the winter and may be found in compact clumps. They are for sale at florists' shops for use as interior decorations, but are at their best in their natural setting.

AMERICAN MISTLETOE *Phoradendron flavescens*	BITTERSWEET *Celastrus scandens*	BURNING BUSH *Evonymus atropurpureus*	SPANISH MOSS *Tillandsia usneioides*	JAPANESE BARBERRY *Berberis thunbergii*
Shrubby, rubbery, green-barked plant that grows as a parasite from some parts of a tree. Leaves are pale green, easily broken, rather thick, smooth, oval, to about 1 inch long, somewhat succulent and the whole plant may form a loose, open globe as big around as a barrel, with branchlets spreading in all directions.	Climbing or twining vine, with length to 30 feet or more. Twigs woody, yellowish green to brown, frequently winter-killing at the tips. Leaves alternate, more or less 2-ranked, to 4 inches long and to 2 inches wide, smooth on both sides, with petioles to ¾-inch long and margins obscurely uneven or with shallow teeth, pointed at the tip.	Tree or shrub. Height to 25 feet. Twigs greenish or greenish-blue, conspicuously but bluntly 4-angled, often conspicuously long and straight. Leaves opposite, to 5 inches long and to 2½ inches wide, pointed at tip, sparingly fuzzy beneath, thin, with ½-inch petioles and with margins with incurved very small teeth.	Length to several feet. Commonly found hanging in irregular masses from branches of trees, telephone wires or other high supports. Stems slender, hoary and gray. Leaves scattered, 1-3-inch long, narrow, thread-like. Both leaves and stems are flexible and wave freely in the wind. Roots are attached to the support above.	Shrub to around 4 feet high, with dark, tough stems, well armed with spines that are sharp, stiff and more or less simple. Leaves are dark green, with unbroken margins, are shed in winter, are to 2 inches long, but normally much smaller, with relatively constricted bases. Roots tough but relatively shallow and surprisingly hardy.
Family Loranthaceae. Order Santalales. About 100 species, of which this one is commonly found on many trees that shed their leaves. Ranges from New Jersey and southern Indiana to Florida and Texas and also in California. All mistletoes are American. Most are tropical, with a few found in the western states north into Washington.	Family Celastraceae. Order Sapindales. Found in rich soil along roadsides, or in woods from Quebec to North Carolina and west to Manitoba, Kansas and New Mexico, being found at high elevations in southern part of range. While there are some 30 species of the genus, only one is in North America, although a few are found in tropical America.	Family Celastraceae. Order Sapindales. Grown as an ornamental, but native from Ontario to Florida, west to Montana, Oklahoma and Nebraska. Persists in spite of abandonment and is relatively common about abandoned homesites in some parts of its range. Some 120 species native of North Temperate Zone, of which 2 are California species.	Family Bromeliaceae. Order Xyridales. Related to the pineapple. A flowering plant, not a moss or a club moss. Found from Virginia to Texas and south, being common in most of its range and usually conspicuous. It is a featured factor in the typical moist southern landscape, and is found south to southern Brazil.	Family Berberidaceae. Order Ranunculales. Does best on well-drained, sunny hillsides, but grown most frequently along borders of paths, buildings and the like. Native of Japan, but has become widely naturalized in many parts of the world, and may be found at considerable distances from communities. Many cultivated varieties.
Flowers either staminate or pistillate on different plants. Staminate flowers in small, catkin-like spikes. Pistillate flowers in short spikes, produce pulpy, pale green to white, 1-seeded berries that are about ½-inch in diameter. Berries eaten by birds and seeds are planted by them in their droppings at some remote point.	Flowers variable. Sometimes, a plant may bear only staminate flowers or other plants may bear both staminate and pistillate flowers. Flowers are greenish, inconspicuous, in clusters to 4 inches long, at branchlet tips. Petals longer than calyx lobes but flowers small. Fruit a yellow capsule to ½-inch through, bursting to show attractive red center.	Flowers purple, to ½-inch across, in clusters, the parts of which branch repeatedly in 3s. Petals usually 4. Fruit a smooth, deeply 3-lobed or 3-parted capsule that is to ½-inch through and bursts to expose a brilliant red center, which in masses gives the plant its common name. Fruits may persist well into the winter.	Flowers are solitary, borne in axils of leaves and inconspicuous, with yellow petals that are bent backward at the ends. Reproduction may be by vegetative division of the parent plant, or by means of seeds that are borne in the inconspicuous capsule that represents the fruit.	Flowers borne singly on stems, not in clusters as in the European barberry; yellow, shallow cups, with a broad pistil in center surrounded by incurving stamens that respond readily to touch and reach over, touching the pistil. Fruit is an oblong red berry that persists well into or through the winter.
Plants are harvested and stored at cool temperatures previous to Christmas season, when they are sold to flower dealers who sell them to the retail trade at fantastic prices. Once believed to have medicinal properties, and those grown on oak were reputed to have magic powers. Makes own sugar and starch with own chlorophyll but draws on host for water.	Conspicuous in fall and winter and even into spring because of red-centered fruits on fertile plants. Propagation by seeds, or more simply by cuttings, which root readily. Such cuttings should be from plants known to bear fruits, if plants are grown for ornamental purposes. Horses have been poisoned by eating leaves. Fruits have poison euonymin.	Hardy. Seems to do well in a variety of soils with propagation commonly being by seeds or by cuttings. Seeds collected in fall are stratified in sand and sown in spring. Wood cuttings are made in fall from matured wood, rooted under glass in winter and planted in spring. Wood is white and weighs to 41 pounds per cubic foot.	Moisture, warmth and sufficient elevated support are essential for the survival of this plant. It occurs to some extent in regions where there are killing frosts and even an occasional snow. A number of insects, including some thrips, are found almost wholly dependent on this plant.	Competes poorly with grasses, and may succumb to drought. Branches root freely where they touch the ground. Not attacked by wheat rust fungus as is the European species. About 25,000 to 28,000 seeds per pound, normally yielding about 4000 usable plants per pound of seed. Germination about 80%. Berries soften during winter months.
May injure many shade trees and timber trees. Dwarf mistletoe attacks cone-bearers. A hook on a pole is used in collecting the plant commercially. Fruits reported to have been fatal to children who have eaten them, but not fatal to pigs. License to kiss one under mistletoe at Christmas has penalties as well as rewards.	Some forms are grown for ornament and have variegated foliage. Fruits collected on twigs in fall are made into bunches and find ready sale in flower shops during winter season and often used as holly substitute. Twining nature of plant may cause it to kill or injure valuable timber trees, and this of course should be prevented where possible.	An attractive and popular ornamental. Bears name arrow-wood because it is assumed that Indians used straight branches as arrowshafts. These were sometimes stimulated by cutting the tree or shrub back or burning it and then using the vigorous straight suckers that came on afterwards.	Man uses Spanish moss not only for decoration in the making of artificial wreaths, but as natural wreaths on wild trees. Moss is collected and used for stuffing furniture, for packing material, and for furnishing emergency mattresses to those who enjoy living out in the open.	Used freely for Christmas bouquets, particularly for table and mantel decorations, and may be collected freely without fear of injuring wild stock. Provides good cover and some food for wildlife, and roots serve well as a soil anchor. Fruits are eaten by pheasant, bobwhite, grouse and other birds, and plants by cottontail rabbit.

COMMON NAME SCIENTIFIC NAME	OREGON GRAPE *Berberis aquifolium*	POINSETTIA *Euphorbia pulcherrima*	STAGHORN SUMAC *Rhus typhina*	CALIFORNIA PEPPER TREE *Schinus molle*
DESCRIPTION	Height to 6 feet. Evergreen shrub with compound, holly-like leaves whose 5 to 9 leaflets are to 4 inches long, dark, shining green above and lighter beneath, with coarse bristle-tipped scallops along the margins. Branches are wholly unarmed. Plants form a rather dense mat, or may be scattered rather sparsely.	Shrub or herb. In suitable climate, may reach a height of 10 feet or more. Leaves elliptical to narrower, to 6 inches long, entire or lobed, fuzzy beneath, milky juiced, and those just below the flower cluster a bright vermilion red. These upper leaves are usually narrower and more nearly entire than are the lower ones.	Tree or shrub. Height to 40 feet with trunk diameter to 1 foot. Branched irregularly like stag's horn because new year's growth begins from bud back from tip. Twigs coarse, furry and somewhat sticky. Leaves alternate, to 2 feet long, compound, of 11 to 31 paired leaflets each to 5 inches long, dark green but red and yellow in fall.	Tree. Height to over 20 feet, with conspicuous, pendulous, slender branches giving top a rounded appearance. Leaves alternate, smooth, to over 1 foot long, compound, of 30 or more slender leaflets, each to 2 inches long and to ½ inch wide, evergreen. Bark scaly.
RELATIONSHIP AND RANGE	Family Berberidaceae. Order Ranunculales. Ranges from British Columbia south through California, growing along roadsides and as undergrowth at edges of wooded areas. Also grown as an ornamental widely, with many horticultural varieties developed, some with variegated leaves. Some 45 species native of North America, Central America and Asia.	Family Euphorbiaceae. Order Geraniales. Native of Central America and tropical Mexico. Known mostly in the North as a greenhouse plant reaching maximum popularity at Christmas time. In some of the forms, the showy upper leaves are white, yellow or pink rather than vermilion. Related Mexican fireplant has blotched red and white upper leaves.	Family Anacardiaceae. Order Sapindales. Native of America. Related to poison ivy and pepper tree. Ranges from Nova Scotia and New Brunswick to Georgia, and west to Minnesota, Iowa and Alabama, being found on dry, rocky, thin, relatively poor soils that support few trees. May form pure stands on talus slopes. A weed, to foresters.	Family Anacardiaceae. Order Sapindales. Native of tropical America; this species from Peru, but about 17 other species known from tropical America. Possibly most commonly grown ornamental tree in southern and central California. Known as mastic tree from its resemblance to the true mastic.
REPRODUCTION	Flowers many, in a cluster arising from axils of leaves with the clusters erect in this species and relatively compact. Sepals 9. Petals 6, with basal nectaries yellow. Fruit a dark-blue, relatively small berry. Flowers in evidence in May and fruits in late summer and fall or sometimes into winter.	Flowers in small, relatively inconspicuous, green clusters at ends of stems or in center of cluster of showy leaves with individual groups about ½-inch across bearing a large yellow gland on one side and without the petal-like attachment found commonly in some other euphorbias. Remember that the showy red parts are not parts of flower.	Flowers borne in terminal, compact clusters, appearing in June and July after the leaves, yellowish-green, and usually with staminate in larger more open clusters on different trees from those bearing the pistillate flowers. Fruits globular, about ⅛-inch through, fuzzy, turning from green to red and in compact masses when mature.	Flowers borne in freely branching open clusters, yellowish-white, frequently sold in flower shops for decorative beauty. Fruits rose-colored, almost spherical, to nearly ½-inch in diameter and fully as attractive as the flowers. Fruits of related Christmasberry tree are smaller and bright red.
HABITS	Favors humid soil sheltered from strong winds and direct sunlight. Usually transplants easily. Commercial propagation by means of seeds sown soon after they mature, or stratified in sand and sown in spring, or by cuttings of half-ripened wood in greenhouses, or by means of abundant suckers in some related species.	After flowering, poinsettias are placed under benches for 2-3 months and allowed to dry at 50° to 60° F. In mid-April, they are potted in new, rich soil and cut back severely. Cuttings may be made from old plants after binding areas with wet sphagnum moss. Soils should be rich, porous and dry.	Wood soft, greenish-gold or brown, to 27 pounds per cubic foot, burns quickly, but leaves little ash. Bark rich in tannin. Pith large, red or orange. Buds hidden by leaf scars. Sour fruits quench thirst on a hike or make a delicious lemonade if boiled in water and sweetened with sugar.	In California, this tree is at its best in the warmer parts of the state. More satisfactory as an ornamental than as a shade or street tree, because its branches frequently extend almost or quite to the ground. Staminate and pistillate flowers are on separate trees, so all do not bear fruits.
ECONOMIC IMPORTANCE	Popular as an outdoor ornamental in regions where weather conditions are sufficiently mild to permit survival. It appears superficially like a blue-berried holly, although it is not closely related to holly. It may be used as an inferior Christmas ornamental where locally abundant. It is the official flower of Oregon.	Cuttings made in morning, dropped in cool water 5 minutes and planted in sand, may root in 16 days and can be transplanted in 4 weeks. Stock plants are fed urea at 1 ounce to 5 gallons of water or ammonium sulfate 1 ounce to 2 gallons every 2 weeks. Ideal temperature for success is 60° to 65° F.	Wood used in Nature craft. Fruit bobs make useful ornaments in Christmas decorations. Plants often grown as ornamentals, particularly a cut-leaf variety, but clumps soon look bedraggled and lose popularity. However, they do give a quick growth. Fruits are eaten freely by birds and wild mammals.	Familiar to all who have seen commercial motion pictures since it is a favored tree by photographers, even if setting is supposedly in New England or Canada, where the tree never grows. This, with eucalyptus, and some palms, make the characteristic California landscape what it is, for the most part.

AMERICAN HOLLY *Ilex opaca*	BLACK ALDER WINTERBERRY *Ilex verticillata*	MOUNTAIN LAUREL *Kalmia latifolia*	WINTERGREEN *Gaultheria procumbens*	PARTRIDGE BERRY *Mitchella repens*
Tree. Height to 100 feet. Trunk diameter to 4 feet. Branches short and slender with new branchlets stout and at first covered with brown fuzz; after first season, smooth. Bark gray, rough to ½-inch thick. Buds sharp, to ¼-inch long. Leaves evergreen, to 4 inches long and 1½ inches wide, leathery with spine-tipped scallops or entire.	Bush or shrub. Height to 25 feet. Twigs fuzzy. Old bark darker than the light-brown, smooth twigs. Leaves to 3 inches long and to 1 inch wide, sharply pointed at tip, with shallow-toothed margins and relatively short petioles, thick, leathery, smooth above, slightly fuzzy beneath, not evergreen, black in fall.	Shrub. To 20 feet high; forming dense thickets with stiff round twigs. Sometimes grows to tree size to 40 feet high. Leaves alternate or sometimes a few opposite, smooth, dark-green, evergreen, pointed at each end, to 5 inches long and to 1½ inches wide with margins somewhat curved towards the under side. Root systems tough and persistent.	Stems woody, creeping, freely branching and bearing erect stems that reach to a height of 6 inches. Smooth throughout, fragrant. Leaves clustered mostly at top of erect branches, dark green, shining on upper surface, lighter beneath, to 2 inches long, tough but tender and delicious when young and fresh.	Length to 1 foot. Stems semi-woody, trailing close to the ground, branching freely, smooth or with slight down, rooting freely at joints, slender, tough. Leaves opposite, short-petioled, with round to heart-shaped blades to nearly 1 inch long but usually much smaller, dark green, shining, evergreen, conspicuously light-veined.
Family Aquifoliaceae. Order Sapindales. In moist woodlands, from Massachusetts to Florida, west through Pennsylvania to Indiana, Missouri and Texas, being found in North Carolina at an elevation of 3000 feet. Probably largest and best in rich bottomlands of Louisiana. Related English holly planted widely where suitable.	Family Aquifoliaceae. Order Sapindales. Found in swamps, low grounds, and other wet places. From Connecticut to Florida, west to Wisconsin and Missouri, with varieties extending range north to Nova Scotia, and related species extending west and south. Over 250 species of *Ilex*, mostly in America, but also in Asia, Australia and Africa.	Family Ericaceae. Order Ericales. Common on rocky and sandy soils, sometimes forming extensive and pure stands. Frequently grows where other plants could not survive. Ranges from New Brunswick to Ontario, Indiana and Kentucky, and south to Florida and Louisiana, but more abundant in the middle of this range.	Family Ericaceae. Order Ericales. Native of North America, where it is found in woodlands particularly of the coniferous type, from Newfoundland to Georgia, west to Manitoba and West Virginia. About 100 species in the genus ranging through North America, through the Andes in South America and into Asia. Salal of Pacific Coast is in this genus.	Family Rubiaceae. Order Rubiales. Native of North America. Found in cool woodlands from Nova Scotia to Florida and west to Texas and Minnesota, reaching elevations of 5000 feet in Virginia. Two species in the genus, of which this is the only one found in America, the other being Japanese.
Flowers found in clusters with staminate and pistillate on separate trees. Pistillate flowers more scattered than staminate, usually with but 1 or 2 in a cluster although a number of clusters may be close together. Fruit fleshy, with stone center, sometimes to nearly ½-inch through, red or rarely yellow; spherical.	Flowers of two kinds. Staminate, in clusters of to 10 flowers borne on short stems in leaf axils. Pistillate, in clusters of 1 to 3, borne, close to stem at bases of leaves almost as though they formed a ring around the stem. Fruit bright red, to ¼-inch through, containing smooth nutlets.	Flowers beautiful pink or white, to ¾-inch across, in compact clusters at the ends of twigs, erect, on densely glandular slender stems. Stamens about twice as many as petals and close to them, surrounding longer, up-curving pistil, bearing web-entangled pollen that attaches itself to insects effecting pollination.	Flower usually solitary in axils of leaves, borne on recurved stems that are to ⅓-inch long. Corolla white, waxy, 5-toothed, to ¼-inch long. Stamens 10, borne on inside of corolla. Fruit a bright red, berry-like, mealy, fragrant, 5-celled structure ripening in autumn and increasing in size through winter.	Flowers borne in pairs at ends of branches, with corolla white, to ½-inch long, tubular, with a flaring mouth divided evenly into 4 segments, each somewhat shorter than the tube. Calyx much shorter than the corolla. Pistil longer than the corolla tube. Fruit a red berry to ⅓-inch through and persistent through the winter into spring.
Wood hard white, uniform, weighing to 36 pounds per cubic foot; tough, weak, turns brown with exposure or age and is used extensivly in wood turning, cabinet work, interior finishing and otherwise. Tree resistant to salt spray, so suitable for ornamental close to the coast. A relatively slow grower.	While leaves of *Ilex vomitoria,* the cassioberry, and *Ilex glabra,* the gallberry, yield a fair substitute for tea, in part because of reported caffein in the leaves, this substance is apparently lacking in the leaves of *I. verticillata.* Nevertheless, it is suggested as a tea substitute. Berries are reported to be poisonous.	Wood hard, fine, brown, weighing to 44 pounds per cubic foot, used in making wooden implements that need to be carved. Green parts contain the poison andromedotoxin, mostly eaten by sheep causing intense salivation and even paralysis, but an animal ill for 2 days may recover. Honey from the flowers may be fatally poisonous.	Found in sandy and other soils, in sun or shade, in mats. Produces oil at the rate of 1 pound of oil to 1 ton of leaves. Similar oil obtained from black birch, and made synthetically. May be propagated by seeds sown under glass in winter or spring or by division. About 2800 fresh berries to the pound.	Flowering time is April through June with sometimes a late fall flowering period. Fruits may be eaten by wildlife or by human beings, but lack the appeal of wintergreen. In spite of frequency with which plant is mentioned as being of medicinal value in quack literature, it has no such recognized value in medicine.
Most popular for fruits borne of course on pistillate tree, the fruits being used mostly for Christmas decoration with the leaves. So popular is this use that unless trees are protected they are almost certain to be despoiled. Flowers appear in Northeast in May and June. Propagated by cuttings. Fruits reported to be poisonous.	Plant is popular as a winter ornamental and fruit-bearing twigs find a too-ready sale in florists' shops, is also cultivated for planting as an ornamental, but its moisture requirements limit its usefulness in that respect. Known as false alder, striped alder, white alder and black alder.	Used most commonly as Christmas decoration for city streets. A legitimate crop if harvested wisely for decoration where abundant. Used also in wooden tools. Eaten sparingly by deer and grouse. Is state flowers of Connecticut and of Pennsylvania. Has many common names such as spoonwood, ivy bush, big-leaved ivy, calico bush and poison laurel.	Young leaves delicious in spring. Plants used in Christmas decorations with fruits on. Oil of wintergreen or checkerberry now comes mostly from black birch or from synthesis. Mixture of blueberries and wintergreen is hard to beat. Eaten by grouse, sheep, deer, chipmunks, pheasants and many other forms of wildlife. Serves useful function as soil anchor.	Excellent ornamental for growing in terrariums and for permanent decoration for center of table. Should be collected sparingly and wisely. Scientific name *Mitchella* refers to the early Virginia botanist John Mitchell, who was a frequent correspondent of Linnaeus, who named the plant.

the completed wreaths look irregular and scraggly they may be trimmed to suit your wishes, of course. If it is difficult to hide the last materials bound to the wreath this area may be covered with a large, showy bow of bright ribbon, or crepe or tissue paper.

Some prefer that wreaths be made of only one kind of material, while others find a mixture more to their liking. A mixture of short-needled hemlock and longer-leaved pine produces an attractive effect. The monotony of a wreath may well be enlivened by the insertion of cones, of colored berries, of beads, sleighbells, popcorn, thornapple fruits and so on, or substitutes for these may be made by molding colored wax from candles into desired shapes and mounting the wax globules on the ends of pieces of wire. In most cases, these additions to the wreath will be added after the wreath has been made. To do this, the base of the cone or other material may be bound with a piece of fine wire. The free end of the wire is then thrust into the wreath where it is desired and fastened by bending it back at the rear of the wreath. Contrasts in color as well as in size in the materials used in a wreath are favored by many, but, of course, this is largely a matter of personal choice. Some favor putting edible fruits such as raisins, grapes, kumquats, cranberries, limes, or even apples into large wreaths. Such wreaths, of course, cannot be used outdoors without freezing and thus spoiling the fruits used. Some people have an idea that one can improve on Nature by spraying the wreaths, or parts of them, with some bright paint, but to me the only excuse for this lies in the possibility that such a practice, using weeds as a base, may save more useful materials that might be used otherwise. Nature does not need to be painted to be truly attractive. Neither, for that matter, does it need to be made into wreaths.

Garlands and ropes are made in much the same manner as described for making wreaths. The principal difference lies in the fact that the materials are bound with cord to a coarser cord instead of with wire to a stiff frame. Usually ropes are made by fastening one end of the base line to a firm object and the green materials are bound to this base. Usually, in making ropes and garlands, the materials selected are somewhat larger than is usual in wreaths. Materials from three to six inches long are satisfactory for making ropes. Care should be taken to bind the materials in such a manner that the rope is uniform in diameter, and, at intervals of a foot or more, the covering materials should be fastened more firmly to the central rope so that slipping will not be easy. This may be done by thrusting short pieces of wire through the central rope and bending these around the binding material.

Care should be taken not to let the finished rope or garland get tangled, as it is easy to make a mess of much hard work by trying to untangle a cumbersome thing like a garland or rope.

Table decorations may be made by merely placing greens about the bases of candlesticks or other decorative equipment. They should be in proportion to the size and use of the table, and, ordinarily, all table decorations should be kept below the level of the eyes of the seated guests. A shallow pie tin filled with wet sphagnum moss will provide a suitable base for some materials that need to be kept moist. The tin, of course, should be completely masked with sprays of green hemlock, huckleberry or other substances. In general, the size of the materials used in table decorations should be smaller than those used in wreaths and garlands. For this reason, wintergreen berries may be better for table use than would pine cones.

Evergreen balls to be hung in windows are popular with some. These are relatively simple to make. A ball of sphagnum moss some six inches in diameter is given some rigidity by binding it with wire. The end of the wire is thrust through the ball finally and extended outside as a basis of support. Into the ball one now thrusts short sprigs of evergreen, either with wire at the tips to give permanence or without such additional support. If the original sphagnum ball is firmly made it should hold the short sprays used satisfactorily. If the ball of sphagnum is dipped in water it will provide moisture to keep the sprays fresh for some time.

Ordinarily, Christmas green decorations have their greatest value because they offer a contrast to whatever the appearance of a room or street may have been. They represent an effort intended to make things a little better than normal. If they are kept up too long they may well defeat the purpose for which they were made. At the most it would seem that such greens should be in season for the week preceding Christmas, and the week between then and New Years. Sprays of bayberry may be used for a longer period as decorations for the mantel, but the wreaths and garlands should normally find another use. Some like to arrange boxes outside the windows and thrust spare greens into these for a few weeks. Edible portions may then be picked up by bird visitors. For the most part, however, it would seem best that the used greens be destroyed. Somehow it seems a disgrace to dump them out at the curb with the garbage, and I prefer a little personal ceremony in front of the fireplace, at the end of which the greens are no more. It may be a matter of sentiment, but the whole use of Christmas green decoration is a matter of sentiment. Why not, then, follow the thing through, but always remember that reason comes into the picture somehow, and the greens should never be used if they have been collected with injury to Nature at her best.

"Colorado's Greatest Slaughter"

Deer herds in the Uncompahgre and Kannah Creek areas of western Colorado had increased to an estimated 24,000 to 33,000 animals—depending on which fish and game official was speaking. This number of animals was said to be more than the range could support, so far as the deer themselves were concerned, and they were also grazing on stock range. So the state game officials decided upon a pre-season shooting of the deer in these areas prior to the regular deer season opening on October 15.

Before this affair started the fish and game commission announced a goal of about 6000 deer to be harvested from a total of 24,000 to 25,000. Seven days killing yielded 8742 animals, about half of them does, whereupon the game manager for the commission came up with some new figures. He then estimated 33,000 deer on the areas, and 11,000 as the desirable kill.

Whatever the merits of official estimates, the fact remains that an army of some 13,000 valiant gunners entered the open areas in the pre-season. And the story is a sad one. At the risk of life and limb, Preston Walker, of the *Grand Junction Sentinel,* roamed the region, and came out with a story that is a sickening commentary on mankind. He wrote:

"Stories coming off the Uncompahgre Plateau about the fusilades of lead hourly expended in a restricted area, and by hunters who know only how to pull a trigger, make the hair of veterans of Kasserine, Anzio, Normandy and the South Pacific stand on end. At least on the battlefield you knew who was your enemy.

"Little less amazing in a 'civilized' country than the deer slaughter is the toll in human lives. Three dead, five others seriously wounded, tells only part of the story. Hundreds have narrowly escaped being killed or wounded . . . as yet no figures have come in as to the number of cattle killed, ranchers' fences torn up and similar damage to property. . . . One careless camper—and there are thousands in this year's crop—can denude a whole forest and watershed with one fire—damage that cattle and deer couldn't possible do in 20 years."

One excuse advanced, says Mr. Walker, for the number of hunters, is the high price of meat. Yet, he points out, no meat would cost as much as this venison if all the costs were figured in. And, he adds, "for every two animals killed at least one is left dead or dying, or the meat is spoiled by incompetent handling. Trophy hunters are out in force, particularly from Oklahoma and Texas. . . . Deer not big enough are shot for 'target practice' and left.

"Fawns also come in for their attention from many of the so-called sportsmen. One report at the *Daily Sentinel* was to the effect that a fawn and doe, scared out of the canyon on the Uncompahgre, brought forth a fusilade of 40 shots, along with cries, 'Get the fawn, too'."

Mr. Walker calls this fiasco, which unfortunately discredits game management by being so described, "Colorado's greatest slaughter."

From a reader living in Delta, Colorado, near the scene of this pre-season orgy, comes the observation that Mr. Walker's words "are an understatement of the ghastly, wholesale slaughter in this area. Hunters have poured in here by the hundreds from states as far away as New York. Liquor is one of the main items in their equipment. *Everything* is a target for their trigger-happy fingers. Small does, fawns, birds and all kinds of small animals are falling in this terrible slaughter. Wounded animals are disregarded in the efforts to get as many notches in gunstocks as possible. This wild mania to kill everything in sight has sickened many seasoned hunters, who say they will never hunt again."

One of the valiant nimrods described a frightened doe that ran right into his arms for protection. Said he: "I threw her and she kept looking up at me so pitfully I like never got her throat cut with that —— —— dull knife."

When deer, or other grazing animals, become so numerous that the habitat that man has left them cannot support them, then steps must be taken to reduce the population. Usually this must be accomplished by harvest with the gun. But this does not mean turning loose hordes of irresponsible gunners whose competence in the outdoors is limited to reading the stories and advertisements in the hunting magazines and concluding that they would like to be doughty nimrods, too. And game officials are equally to blame through their publicity, which is calculated to lure more license money, particularly from the more lucrative out-of-state licenses.

Even more serious, it seems to us, is the spectacle of blood-lust loosed by such invitations to wholesale slaughter. The minority of good sportsmen among those who parade under this name must cringe at such orgies, but they seem to do little or nothing about them, assuming they so desire. It is their house to clean, and they would better be about it.

Such adjectives as "epoch-making," "miraculous," "revolutionary," and, perhaps, Hollywood's favorite, "colossal," have been applied to the powerful economic chemical poisons of which the weedicide, 2,4-D, and the insecticide, DDT, are typical. Widespread advertising promotion and glowing publicity have brought about the wide use of these chemicals. The results obtained have been often spectacular, at least superficially. Now, in medical, scientific and agricultural circles, questions begin to arise as to the long-range effects of these poisons; as to their effects upon animal and human life; as to their effects upon the soil of the future. In this article, Mr. Larson, who has devoted long study to soil, weeds and chemical poisons, raises important questions that need answering.

Are Weedicides Wise?

By J. DAVID LARSON

A PHILOSOPHER has wisely observed: Nature is always intelligent in achieving her ends. By contrast, man, in the attainment of his objectives, reserves for himself the privilege of irrational conduct.

An outstanding example of man's irrationality is the much publicized chemical weed eradication program. This program seems to demonstrate man's inveterate propensity for assuming that Nature's law of order may be violated with impunity, without invoking the long-range penalty associated with cause and effect. The current philosophy would appear to be that, since the immediate results of poison spray seem favorable, there is no need to be concerned about future consequences. Is not this attitude the manifestation of human nature's blind side? Is it not the tendency to regard today's conduct as exempt from any ultimate retroactive effect?

The campaign of weed eradication by chemical spray is in full swing. These weed killers have been widely and enthusiastically received. Hailed as preeminent achievements of the laboratory, they are now applied with increasing tempo. Certain agricultural periodicals give high praise to the performance of the lethal spray technique, pointing out that by spraying oat fields directly after planting, Canadian thistles and other noxious weeds are effectively destroyed. In California and elsewhere the program of weed eradication has reached such proportions that the job is being performed by airplane. Thousands of acres are thus quickly sprayed with 2,4-D and other chemicals. In the middle West it is reported that an organization has contracted to spray chemical weed eradicators over an area of 20,000 acres.

Alfalfa and other hay crops have been sprayed with weed killers, demonstrating that wild mustard, foxtail and other weeds disappeared—temporarily at least. What will be the ultimate effect of this practice?

"Organic matter, which is the life of the soil, must be restored. . . . How can one kill weeds without killing in large measure the life of the soil?" *The Prairie Farmer.*

Evidently the long-range phase of this new technique of weed control has been given no consideration. We can only conclude that the advocates of this spray method would imply that any deleterious effect upon forage crops, or to domestic animals, is so negligible that it may safely be ignored. Up to this time we have heard little criticism of the new weed eradication relative to possible harmful effects upon the soil. Nevertheless, sober consideration raises the question: Can anyone be so sure that no permanent soil injury will result? Has this lethal weed eradication program been tested long enough to guarantee that long-range soil damage cannot occur? Or is it possible that the ultimate effect upon the soil does not come within the purview of the advocates of chemical weed spray?

At this time we do not need to be reminded that for a hundred years farmers followed wasteful agricultural practices that culminated in dust storms, wind and water erosion, and other fertility-destroying evils. Since the soil is *a living thing*, consisting of organic matter, beneficent bacteria and other organisms, we need to be assured that such fertility-promoting agents will not sustain irreparable damage, along with the killing of weeds. The person accustomed to the wholesome habit of reflection cannot fail to contemplate what must be the future status of the soil of certain beet growers and nurserymen who have adopted the so-called "pre-emergence" weed spray technique. Spraying their fields shortly after the seed is planted, beet growers claim that considerable savings in labor costs in the control of weeds have been effected. The nurserymen who have begun to use the chemical weed spray for the pre-emergence control of weeds have found that it has proved injurious to their flower seedlings. Consequently, the flower growers have been warned to get the spray on the ground before the seeds sprout! When flower

seedlings, together with weeds, are killed by a lethal agent, it would seem reasonable to assume that the cumulative effect of the poison may likewise affect the living organisms and the organic matter within the soil.

Indiscriminate use of powerful chemical insecticides and weedicides constitutes a hazard of possible lethal consequence to humans, warns the American Medical Association. In an editorial in its Journal, the Association calls for voluntary controls by producers pending further study of the effects of these chemicals, or legislation to control their use. Housewives are urged by the A.M.A.'s council on foods and pharmacy to wash thoroughly all foods and vegetables before preparing them for consumption.

It is, of course, no secret that chemical weed eradicators are not new. For some years they have been employed on golf courses to destroy plantain, dandelion, knotweed and other weeds. For this purpose the spray often used was an arsenical preparation. Arsenic, it has been definitely established, is toxic both to plant and to human life. Sprayed on golf courses, the arsenical compound was supposed, theoretically, to accumulate on the broad leaves of weeds in such concentration that they would be killed. Any part of the spray deposited on the slender spears of golf-greens grass was alleged to be harmless! Evidently no thought was given to accumulation, from repeated applications of the arsenical poison, within the soil itself. But the thoughtful mind reflects that frequent doses of a poison must build up, causing serious after-effects. There may easily be a definite connection between the continuous use of the arsenical weed eradication spray and the persistent recurrence on golf greens of such fungus diseases as brown patch, dollar spot, and snow mold. To control these fungi, the employment of a mercurial spray has been the standard practice. Is it not conceivable that this poison, also, exerts injurious effects upon the soil; effects such as conduce to the annual return of the brown patch and dollar spot pest? Unquestionably the mercurial spray is in the same category with chemical weed killers. A greens-keeper has informed me that, invariably, after the application of the mercurial spray his men were so seriously affected by inhalation of the vapor that they were forced to take to their beds to recuperate! Such a program can hardly be regarded as intelligent.

From a Wisconsin farm comes the report of extensive use of 2,4-D for weed-killing, resulting in the failure of the soybean and fruit crops. This appears to have been caused by the destruction of honeybees by the chemical, since apiarists in the locality also report the practically complete failure of the honey crop, as well.

One is struck by the casuistry of the radio commentator who, on the one hand, calls attention to the fact that cattle, grazing on alfalfa and clover in fields sprayed with sodium chlorate weed killer, sickened and died, while in the same breath he extols the virtues of the new weed eradicators. It would seem that common sense would suggest that a weed destroyer exerting such deadly effects on cattle, after eating sprayed forage, must also produce an insidious effect upon the organisms living within the soil. It is an interesting circumstance that these advocates of weed eradicators have observed that when 2,4-D and other chemical sprays have killed a certain type of weed, another —an entirely different weed variety—sprang up in its place! Such a phenomenon is worthy of more than passing comment, suggesting that the underlying cause of the noxious weed has been left untouched.

From our experience and observation it is noteworthy that the most ardent champions of chemical weed eradicators frankly acknowledge that when 2,4-D or similar sprays are used on a lawn for dandelion, crab grass, and other weeds, the grass promptly withers, temporarily, even though eventually it seems to recover. This fact seems to imply that in comparison with an agent of total destruction the chemical weed killer differs only in degree.

Nor is lawn grass the only vegetation susceptible to damage from chemical weed spray. Farm periodicals repeatedly warn that when using the spray it should be done on a quiet day, for it is conspicuous that vapors from the spray may be wafted by the wind to settle on flowers, vegetables, and shrubs, with serious damage to such plants. A landscape gardener reported that a client destroyed completely his own hawthorn shrubs while spraying with 2,4-D to kill lawn weeds. Vapors from the spray, drifting to the hawthorns, were deposited on the leaves. Soon thereafter the shrubs died.

At a recent meeting of The American Association for the Advancement of Science, a professor of a southern agricultural college announced that farmers who spray small grains with 2,4-D would better be prepared for damage suits. He stated that spraying the weed eradicator by airplane on rice has seriously damaged cotton in fields 25 miles distant!

"Friendships, neighborliness, and security from damage suits, all may be blasted by careless use of 2,4-D just as definitely as dandelion and plantain in lawns or mustard weeds in wheat fields can be killed by careful use. . . . In towns, the trouble is most likely to arise when 2,4-D is sprayed on lawns and drifts in even the slightest quantities to the flower beds of neighbors. . . . Nearly all the plants commonly grown in vegetable and flower gardens are sensitive to 2,4-D, and even a trifling and invisible drift of spray or dust across a property line can be the cause of widespread killing of flowers, including many perennials expensive to replace. . . ." *Release of the U. S. Department of Agriculture.*

In the face of these events an author writing in a leading farm paper asserts that weed eradicators have clinched

their place as one of the greatest discoveries in the history of agriculture, while at the same time he warns that serious mistakes will with certainty be made by people who do not realize the power of their weapon. He fails to find any inconsistency in the statement that in order to kill perennials heavier dosages of the weed chemical should be used, even though the yield of the crop may be considerably reduced. This agricultural writer blandly affirms that a definite concentration of the poison solution, when strong enough to kill broad-leaved weeds, may injure legume seedlings. Further, he advocates a solution powerful enough to kill tough perennials such as bindweed and thistles, even if the grain may be hurt when sprayed, but he apparently is oblivious to the danger to human beings, who may later consume such sprayed grain. He advocates, also, a dosage strong enough to kill weeds in pastures, where it may also kill the clover and other legumes. This author may be said to have the courage of his convictions, for he recommends spraying several times in order to kill deep-rooted perennials, and he reminds his readers that crab and quack grass are particularly resistant to weed-killing poison sprays. Only one word of caution is advanced: In hot weather spraying is to be avoided. Finally, he is frank enough to acknowledge that there is still much speculation with regard to the weed-killer's possible effects on plant and root growth, and consequently on the yield and quality of the crop.

"In addition to the soil hazard, it has been found recently that there is considerable accumulation in the meat of animals that are fed on forage dusted with DDT. It builds up in the meat, particularly in the fats. And it comes through just as toxic in meat that has been cooked as when it is fresh. The secretion of DDT in milk concentrates in the butterfat, so that butter might have fairly high quantities. The Department of Agriculture is not recommending DDT for forage crops to be fed to milk cows." ***Testimony by Dr. P. N. Annard, Chief of the U. S. Bureau of Entomology and Plant Quarantine, at a Congressional hearing.***

"According to U.S.D.A. experts on economic poisons, preparations containing '2,4-D,' when used as a selective weed killer, have been found to cause damage to valuable crops and plants under some conditions. Used in dust form, the poison may drift great distances and injure desirable plants miles away from the place of application. Fine sprays also may drift considerable distances. Esters of the poison are somewhat volatile and should not be applied close to plants they are likely to kill." ***The Chemurgic Digest.***

It is my belief that had the writer of the article had the following experience he would doubtless not be nearly so enthusiastic in praise of poisonous weed sprays. A prominent corporation executive reports that after his lawn had been sprayed with weed eradicator, his little granddaughter picked a blossom that had been contaminated with the chemical. Raising the flower to her lips the little girl was so severely poisoned that she died directly as a result of this contact with the small amount of spray. If animals, and if human beings, may be killed by contact with the weed eradicator poison, it is safe to conclude that there must ensue some degree of long-range injury to the soil, and to vegetation, from its use.

We believe it was Bacon who said: "He who follows Nature is never out of his way. Nature is sometimes subdued, but never extinguished." It is difficult to believe that the chemical poison procedure in subduing weeds will not eventually meet with certain retribution upon mankind by Nature.

We have described a few cases of retroactive effects from the use of chemical weed eradicators. These examples may possibly be regarded by some as so isolated as to be considered rather negligible. On the other hand, interpreted as *symptoms* of deeper underlying phenomena occurring within the soil, these apparently nominal cases of the injurious effects of poison spray are portents of serious consequences to come! The question then arises: If chemical poisons are dangerous in the long run, must we be resigned to weeds? Have we no recourse other than the laborious task of "roguing," pulling and digging out the individual weeds? This is a logical and well-justified inquiry, the answer to which, happily, is near at hand.

Fortunately for the future prosperity of agriculture, and for the conservation of all factors contributing to the fertility of the soil, a constructive procedure for eradicating noxious weeds *is* available—a procedure that likewise controls the "innocuous" weeds with only a minimum of effort. It may be asked: If noxious weeds may be eliminated by a radical procedure, why must the other kind—the innocuous variety—persist to annoy the tiller of the soil? The answer to this query involves a philosophy of the soil; a knowledge of the chemistry and physics of the chemical elements that constitute a *normal* virgin soil, and their rational interpretation.

Death of many birds at the National Audubon Society's Nature Center at Greenwich, Connecticut, appears to have been caused by extensive spraying of nearby forests and fields with insecticides. The Society has also received reports of wholesale bird destruction elsewhere, apparently from the same cause. From Morristown, New Jersey, for example, came a report of a large group of birds all found dying from convulsions at the same time, and a postman in the same community reports a "considerable number of birds" falling dead from trees recently sprayed.

My interest in weed control might be considered as rather an incidental activity, for it evolved as the result of observations in the application of our *Normal Soil*, which is "man-made" topsoil, identical with *normal* virgin

(Continued on page 549)

To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

The White Dwarf Stars

By ISABEL M. LEWIS

THE discovery quite recently of nine new, white, dwarf stars by William J. Luyten, of the Department of Astronomy of the University of Minnesota, and David MacLeish, of Cordoba Observatory in Argentina, has increased to one hundred the number of these stars now known. Sixty-one of these stars have been found through a study of the motions of faint new stars at the University of Minnesota, with the active cooperation of the Steward Observatory of the University of Arizona and of the Cordoba Observatory, where it is possible to observe many stars of the southern hemisphere that are not visible in northern latitudes.

White dwarf stars have properties that are amazing, even to the astronomer, who is accustomed to finding many strange and remarkable objects in the heavens. One cubic inch of the stuff of which these stars consist would weigh, if brought to earth, from one ton to a thousand tons. They are all objects so small that one would be inclined to class them with planets in size, rather than suns. They are, however, excessively hot, as their white—and in some instances blue-white—light would indicate. A surface temperature as high as 50,000 degrees is not unusual in such stars. Their faintness is not due to the fact that they radiate feebly but to their dwarf-like dimensions. They are found in greatest numbers in the neighborhood of the sun; that is, chiefly within a distance less than about thirty light years, which is that of the nearest stars. This is due to the fact that, in the search for them, faint, white stars of large proper motion—that is, motion across the line of sight—are examined. Although a few *distant* faint stars have rapid proper motions, by far the greater number of such rapidly

moving stars are near stellar neighbors of ours; and their properties can be more readily studied, white dwarfs more easily detected among them, and their distances measured and spectra better studied than if they were at greater distances.

There are, it is believed, considerable numbers of these white dwarfs in our galaxy and, it is reasonable to assume, in other galaxies, that cannot be detected by any means now available. It has been estimated that the total number of white dwarfs in our galaxy must be something like a billion, on the assumption that their distribution is about the same in other parts of the galaxy as it is in our immediate stellar neighborhood.

Long before the existence of stars now known as white dwarfs was established, the astronomer Bessel noticed that the brightest of the stars, Sirius, behaved as if it were subject to the gravitational pull of a heavy companion star. The faint companion star was discovered visually in 1862. It is invisible in all but the largest telescopes, although of the eighth magnitude, because it is so close to the bright star that it is lost to view in the glare of its light. Eventually it was found that Sirius B, as it was called, was a most peculiar body. Although it gave only one ten-thousandth as much light as Sirius, its mass was four-tenths that of the principal star. It was also found—what was most remarkable—that it was a brilliant white star radiating, square-inch for square-inch of surface, three times as much light as the sun. This could only mean that it was a body of very small dimensions—about 25,000 miles in diameter, but so massive for its size that its density was 50,000 times that of water! It was difficult to believe that any brilliantly radiating stellar body could have such an astounding density. Yet the companion of Sirius is one of the least dense of the white dwarfs. One cubic inch of the material of which it is made would weigh, if brought to earth, *one ton;* but the white dwarf known as Van Maanen's Star has a density about 400,000 times the density of water, and would weigh about *eight tons* at the surface of the earth. Our own sun has a density about one and forty-five hundredths that of water; and although different types of stars vary considerably among themselves in density, the hottest types have, in general, only a few hundredths of the density of the sun, while stars of types similar to the sun are also very similar to it in density. Red giant stars have densities that are only three-thousandths that of air at sea level. Compared to the densities of these stars, the abnormally high densities of the white dwarfs are truly amazing.

The explanation generally accepted for the enormous densities of white dwarf stars is that the material of which they consist is made up of the nuclei of atoms that have become stripped of their atoms and are therefore closely crowded together. An atom is known to consist of a central, positively charged nucleus around which revolve, in a way somewhat analogous to the revolution of planets around the sun, negatively charged particles, or electrons. Some atoms are much more complicated in structure than others and contain many more electrons. The heaviest radioactive elements contain more than ninety electrons in intricate arrangement. Hydrogen, the most abundant element in the universe, has only one electron; helium comes next with two electrons. When an atom becomes excessively hot it is possible for some of its electrons to be "knocked off," and the structure of the atom to be changed. White dwarfs apparently consist largely of substance that has been stripped of electrons and closely packed. How these stars originated is a matter of great importance to the physicist, as well as to the astronomer. Dr. A. S. Eddington, the famous British astronomer, gave much attention to the structure and origin of these stars, and advanced a theory of their origin in 1939. According to Eddington's theory of the origin of white dwarf stars the material of the galaxy was originally pure hydrogen, and the earliest of the stars formed from this material were also composed of hydrogen. The white dwarfs were, according to Eddington, formed in large numbers during this same period in the early history of the galaxy and consisted chiefly of hydrogen. It is known, from observational evidence, that there is in interstellar space, both in our galaxy and in other far distant galaxies, an enormous quantity of matter in the form of diffuse gases. There is also evidence that the total amount of matter in interstellar space far exceeds that which exists in the stars, and that it consists chiefly of *hydrogen.* The quantity of the heavy elements in interstellar space amounts to only a few percent of the whole, and is in the form of both gaseous matter and cosmic dust. It is also true that the combined masses of all the stars consist largely of hydrogen.

There is a possibility that stars also exist in which the supply of hydrogen has been exhausted. Stars without hydrogen, it has been shown, finally enter what is known as a collaps- (Continued on page 553)

Hunter and Dogs

By JOHN GALLINARI WHIDDING

Now the Great Hunter with His Dogs in cry
Crosses the winter night's enchanted clearing,
His jeweled dagger gleaming at his thigh,
His shaggy shield upraised, his heart unfearing.

Hare underfoot—lithe object of pursuit—
Hides in the stubble, daring not to quiver
When brave Orion stamps his star-shod boot
To tempt The Bull across The Winding River.

Earth was so young when first you trod the skies,
Lord of the dark and brother to the thunder!—
But still, with urgent heart and sparkling eyes,
December's child looks heavenward in wonder.

Marsh Marigold

By EDWIN F. STEFFEK

MANY generations have looked forward to seeing the marsh marigold, *Caltha palustris*, poke its cheery head up out of the swamps, wet meadows and brooksides each year. Its bright yellow flowers rising above the rounded glistening leaves seemed to announce that at last spring had come. From Newfoundland to the Carolinas, and from the Atlantic Coast to Saskatchewan and Nebraska, it has long been a favorite. Now it is gone from many of its old haunts, thanks not only to advancing "civilization" but also to those who look upon this charming native merely as a pot-herb, to be cooked as spinach.

However, this need not be so, for this plant lends itself readily to cultivation in damp, heavy soils and mucky places. It transplants readily, and can be dug up from a proposed construction site at almost any time of year, if some care is exercised. While marsh marigold likes full sun at the time of flowering, it welcomes some shade later in the season. Often in its native habitat its roots are covered with several inches of water during wet periods with no harm resulting. The flowers themselves are handsome, buttercup-like, up to an inch and a half across, scentless, and bloom about a foot above the earth or water surface.

For those who wish to further the cause of wildflower conservation by establishing them in suitable locations, marsh marigolds may be dug up immediately after flowering and divided. One fair-sized clump can often yield as much as eight to ten strong divisions. Propagation by seed may also be accomplished. If sown soon after ripening in a flat kept constantly moist, they should germinate the first spring, and may bloom the third year.

A Winter Thought

By KATHERINE CARR HENZE

He who presumes to write of new, clean snow
Must choose his words with more than common care,
Lest his descriptions sadly fail, although
They seem as clear as jewels, as light as air.

A vision so supremely bright and fair
Deserves a purer phrase than those we know.
May God, if He has any tools to spare,
Lend us the words we need to write of snow!

Why I Like Snow

FOR a number of reasons, practical and esthetic, I like to see it snowing. Proper, that is, dry snow, is less messy than rain both in the air and under foot. It seals cracks and makes homes snug, at length folding them in like a blanket and isolating them from all else. It covers everything with white and makes the earth look clean. In that stage, it does away with every unsightliness and creates beauty that has been sung over and over again by poets.

Falling snow pleasantly tingles the face and feels good even as it steals into the nose and mouth. It spangles the clothing and muffles the way for the feet. It makes another world in which we are stimulated and delighted.

More, it sets us a good example of buoyancy and freedom. Some of the flakes may be driven by the wind, but never all. Always some dance merrily each in its own way. We say that snow falls, but these flakes go up and everywhere. As the air eventually clears, they too must fall and join the mass below, but in their time they float and leap. Hither, thither, they go, near and far, hoppity, skippity, helter-skelter, apparently just as they please. Free, free for life, though it be but short. Merry, gay, dancing sprites, elves of the storm, I greatly admire your unruled and frolic flight.

W. L. McAtee.

Can You Crack These?

By EDWARD DEMBITZ

Rocks and stones, as any geologist can tell you, are not just something that occupants of glass houses should not throw. Besides, most of them are too heavy. In your ramblings about the world you will run across (or walk around) many notable individuals of the mineral family. Here are descriptions of some of the more famous ones. Each has the distinction of containing in its name either the word "ROCK" or "STONE." Can you identify them? A score of eleven correct is well above average. Answers are on page 547.

1. A perpendicular cliff of white sandstone on the south bank of the Illinois River. On its flat summit the last survivors of the once powerful Illini tribe, entrapped by Chief Pontiac's followers, perished by starvation.
2. A piece of black basalt, now in London's British Museum, whose equivalent inscriptions in Greek letters and in hieroglyphics provided the key to deciphering the writings of ancient Egypt.
3. Eroded in the form of a castle, this pueblo-topped sandstone cliff is covered with hundreds of legible carvings left by early Spanish explorers, scouts, priests, trappers . . . the oldest (1605) being that of Governor Onate, New Mexico's first colonizer.
4. A precipitous height which dominates the modern city of Edinburgh, and was for centuries the site of the ancient city and of the royal residence of Scottish kings.
5. This New England coastal landmark, on which white men and women are said to have first set foot in December of 1620, is preserved under a beautiful portico of granite.
6. While sheltering himself from a thunderstorm in the cleft of this Somersetshire, England, rock, A. M. Toplady had the inspiration for his best-known hymn.
7. Built into the side of the Kaaba, this sacred stone, said to have been received from Paradise by Abraham, is kissed by every Moslem pilgrim to Mohammed's birthplace.
8. Discovered in Minnesota and now in the Smithsonian Institution at Washington, this carved stone contains a message ostensibly written by a party of Vikings who explored North America in 1362 A. D.
9. A triangular stone in the wall of a castle near the city of Cork, it bears the inscription "Cormac Mac Carthy *fortis me fieri fecit,* A. D. 1446" and is reputed to confer irresistible persuasive eloquence upon all who kiss it.
10. A dome-shaped hill of granite near Atlanta, on whose northern face there is a gigantic, uncompleted war memorial portraying, in relief, noted Confederate soldiers.
11. At first it was the inauguration stone of Irish kings at Tara, then of Scottish kings at Scone, and since the 13th century, of English kings at Westminster Abbey.
12. In Wyoming on the Sweetwater River stands this 180-foot high rock, named on or about one Fourth of July in the early 19th century. The names of some 50,000 users of the Oregon Trail, which passed alongside, are inscribed upon it.
13. In ancient Rome those convicted of treason were ordinarily killed by being tossed from this steep rock, which forms part of the Capitoline Hill.
14. A sandstone reef in the North Sea that was the nemesis of Ralph the Rover, who according to tradition and Robert Southey's ballad, destroyed its warning signal in order to plague the good Abbot of Aberbrothok.
15. Carved in the 15th century to serve as a sacrificial block, it is the most famous monument of the Aztecs and is now exhibited in the Mexican National Museum. The decorative motif is a surprisingly accurate concept of the division of time.
16. A colony of tailless monkeys dwells within the caves and passages of this fortified promontory, located near the southern tip of the Iberian peninsula. It is named from the Arabic words "*gebel al Tarik.*"
17. A stone dating from the reign of Mesha, King of Moab in the 9th century B. C. Its Semitic inscription, the oldest known, tells of Mesha's wars with Israel. Fragments are now in the Louvre.

Christmas Song

By PAUL H. OEHSER

Clothe now the dying branch with flame,
Bring winter back to life;
Give the nameless a name
And the spirit a wife.

So then the tree will bloom again,
The quick season return,
And in the sons of men
The sacred fire will burn.

The bright bush, unconsumed, will last
Longer than years are long,
And travelers going past
Will hear a deathless song.

TWO LITTLE BEARS

(Continued from page 523)

he hung upon the little spruce. In a medicine bag he found some black and white loon feathers. He attached these to the tips of the twigs. He cut strips of little figures from birch bark and draped them from twig to twig.

Then he took his copper trade kettle and filled it with deer tallow and placed it upon the embers. While the tallow melted, grandfather cut a number of pieces from an old basswood bark fishline. Tying one end of each to a stick, he fastened a small pebble to each of the opposite ends.

When the tallow had melted, he lowered the weighted strings into the kettle, and then pulled them out again. Each time he lowered the strings another coating of tallow adhered to them. Finally he had a number of small, thin Christmas candles. These he also attached to the spruce twigs.

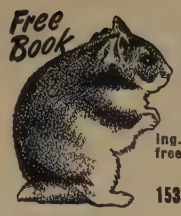
It had taken him a long time to decorate the small tree, but at last he was satisfied. Now that it was finished, he was very sleepy. However, he kindled a dry twig and lit each of the home-made candles and, when they were all lighted, their beauty took him back to his shining tree of long ago. And then his eyes closed. His head began to nod, and finally he slept, sitting upright. All was quiet within the little bark wigwam. Outside there was only the still, starry night.

And then two small dark shadows emerged from the larger tree shadows and moved across the blue, star-lit snow —soft blurry shadows that looked as if someone had dropped two blots of ink upon wet blue paper. Now and then the little shadows stopped and sniffed the air, and then one could see they were two little bear cubs. The lodge in the spruce clump seemed to intrigue them, especially the twinkling lights within.

They slowly made their way through the snow, leaving little tracks of their hind feet, for they were walking upright. They stopped at the door of the lodge and peeped in. Inside the lodge it was warm, and there was a comforting smell. So the two little furry babes of the woods slipped into the wigwam and curled up under the shining tree.

Soon their little snores awakened the Indian boy. At first he thought that he was dreaming. Then he realized it was no dream and he awakened his sister. "Grandfather," they cried, "look! This night has brought us a shining tree and the shining tree has brought us gifts, two lovely living gifts, who will play with us and make us happy."

And this is how the shining tree and its gifts came to the little red children in their bark wigwam, deep in the spruce forest; but no one knows, even to this day, why two little bear cubs were wandering in the forest on Christmas Eve.



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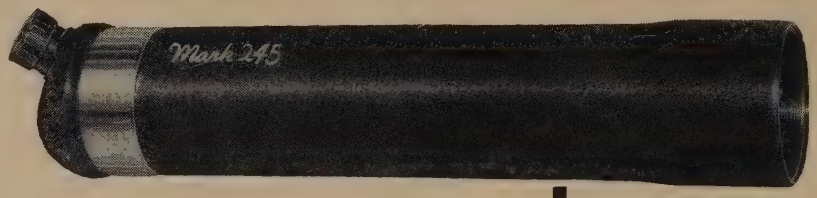

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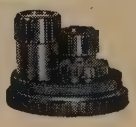

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The School Page

By E. LAURENCE PALMER

Professor of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

CHRISTMAS GREENS IN SCHOOLS

THE custom of bringing Christmas greens into school during the holiday season is almost universal. Few practices offer a better opportunity for the teaching of good conservation philosophy, but this opportunity, in most cases, is probably overlooked because of other demands on the teacher's time at this busy season. The teacher of art can point out what is good taste in decorative planning, but she may know nothing of the biologic requirements of the materials she uses at this season of the year. The agriculture teacher may know how to select materials in the field so that growths are helped, but he may know little of what makes a decorated room look just right. Why cannot the two get together in planning for use of Christmas greens?

In the special insert in this number, and in the earlier insert on "Evergreens Forever," we have given pictures and data on most of the plants that will be found in the markets for use as decorative material at this time. There will undoubtedly be local material that will be equally popular in some places. In all probability the conditions that govern the growth and harvest of of these local materials is similar to what prevails with most of the species here considered. Therefore an examination of the text in the insert will be worth while.

Between harvest and waste-can a few questions arise that a teacher may wish to put to the students regarding Christmas greens. The answers to most of them may be just common sense, or may be developed from the material here published.

Can Christmas greens, found in the field, be harvested with the consent of the owner? If they are harvested, will it affect adversely the remaining living materials? Will branches that are taken change the shape of the tree permanently and in an undesirable manner? Will the harvested material make room for a better development of surviving materials that are now too crowded, or will it soon be too crowded? Is the harvested material really needed, and is there assurance that it will be used effectively? Does the removal of the greens affect adversely the general appearance of the territory from which they came? Can they be removed without injury to adjacent materials? Are they gathered in a way so that conditions are improved for surviving neighbors or for parts of the plant not harvested? Are you sure that the material to be harvested is the best available for the purpose intended? Is the material being harvested taken at a time when it may be at its best when put to use, or is it being taken so soon that parts of it will begin to drop off as soon as it is brought into a warm room? Is it legal to harvest the material in your community?

Do you have available sufficient variety of materials to make your Christmas decorations effective; that is, have you included in your collections, cones, fruits and other plant parts that may add color to the greens? Have you thought to add something like white cedar, which may add fragrance to the air of the room in which it is to be kept? Have you provided a floor cover under your tree to catch parts of the decorations that may fall off? Have you studied the possibility of using substitutes for the natural material that may serve your purposes ever better? Have you learned if these substitutes are available? Have you provided opportunity for many of those who will enjoy your decorations to participate in the collection and arrangement of the materials? Have you explored exhaustively the danger of fire arising from tinsel, dried greens, paper and other highly inflammable material coming in contact with candle flames, sparks from the fireplace, candles on trees (which should be avoided always) and poor electrical connections of Christmas tree lighting equipment? Have you made provision for the use of standing trees outside your home or school, which can contribute, without being disturbed, to your celebration of the Christmas spirit? Can you name the materials used in your decorations, and can you help others make the proper identifications without appearing to "show off"? Do you know enough about the growth habits of the materials being used to be able to tell others something interesting about their probable source? For example, which of your greens came from swamps, which from open fields, which from forests? Do you know something of the probable geographic distribution of the plants being used for Christmas decoration? Do you know enough of the techniques of harvest to realize the probable effect of the gathering?

Have you consulted some good judge of beauty to make sure that your attempts at decoration have not missed fire by being too elaborate, too monotonous, too abundant? Have you avoided making your decorations too much of a burden on yourself and others so that you are really too tired to enjoy them once they have been completed to your satisfaction? Are the decorations in keeping with the size of the room, the shade of your house, the furnishings of the room and the size of the crowd that may be expected to enjoy them? Have you made provision for those who pass outside your home or school to see what a fine job you have done when they glance through your window? Have you seen to it that even the gifts placed on your tree, or elsewhere, have a small sprig of green that may go with the gift to the receiver, and carry with it the Christmas spirit to each person individually? Have you seen to it that, where appropriate, everyone who is to participate in your celebration of the season is remembered in some way? A box of candies, cookies or a box of evergreen trimmings with pins may help you in an emergency if you find that you have overlooked someone or have some unexpected guests for whose happiness you may have made no provision. Remember there is nothing like being remembered and nothing worse than being overlooked when others are being remembered. Have you remembered to provide ornaments that are appropriate for your doors, windows and fireplace, as well as for the walls, tables and the Christmas tree itself? There is nothing worse than elaborate display of ornamentation in one place and nothing elsewhere. Have you made provision for as many persons as possible to take part in the distribution of the gifts that are available to your guests?

After your Christmas season has passed, have you made some

The Nest

By ELEANOR THAYER

Dear bird, concoct your castle in the air
Deep in the shadows of the swinging vine;
Go, weave the feather and the horse's hair,
That wisp of straw, that tangled piece of twine.
Cushion the whole thing with the softest fluff
Plucked from unfolding ferns or from your breast . .
And if you are afraid that's not enough,
Why, take some mud and daub it on your nest.
Steal from the rock the lichens and the mosses,
Or if you think these things somewhat absurd
Then spin, instead, of finest, silken flosses
A home more suited to a baby bird.
What's that you make? A castle in the air?
It is a bassinet that you prepare!

provision for the use of your materials, at least until New Year? Have you seen what use could be made of your waste materials in providing food and shelter for winter birds? Many greens may well be used in the making of winter feeding stations for birds. Have you seen to it that if you use your decorations for making feeding stations for birds you have also provided some food for the visitors to these stations? Even an old Christmas tree, properly cut up and arranged around a fence corner, may provide a sheltered place for some wildlife when the blizzards of January get under way.

After you have disposed of your surplus decorations that are of the perishable type, have you stored safely and adequately those things that can be used again another year? Have you disposed of the perishable materials as effectively as possible? Have you thought of some sort of fireplace ceremony in which you finally feed into the fire of an evening the decorations that have given you and your friends a happy season? Do you enjoy seeing Christmas trees that you know have been the center of attraction of a home for a few days stacked unceremoniously by the garbage can? Have you thanked adequately those who helped you collect, arrange and use your Christmas greens? Are you sure that, when another year rolls around, you could win the enthusiastic cooperation of any who have helped you this year in your program? Are you so exhausted that you resolve that another year you will not try again to have a program such as you had this year? If you are you better think again because the chances are you will do it all over again and enjoy it, even though you may offer some sort of complaint. Did you have a good time and do you really feel that everything went off as it should? So, Merry Christmas.

ANSWERS TO ROCK QUIZ

1. Starved Rock (90 miles southwest of Chicago)
2. Rosetta Stone
3. Inscription Rock (100 miles west of Albuquerque)
4. Castle Rock
5. Plymouth Rock
6. Rock of Ages
7. The Black Stone of Mecca
8. Kensington (rune) Stone
9. The Blarney Stone
10. Stone Mountain
11. Stone of Destiny, Stone of Scone, or Coronation Stone
12. Independence Rock
13. Tarpeian Rock
14. Inchcape Rock (or Bell Rock)
15. Calendar Stone (or Stone of the Sun)
16. Rock of Gibraltar (Arabic words mean "height of Tarik"—who founded a strong fortress there in the 8th century
17. Moabite Stone

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Camera Trails

By EDNA HOFFMAN EVANS

"Tempus fugit," according to the old Romans. "Time flies." It certainly does. Sometimes I wonder whether it moved as fast for the average Roman as it does for us in the twentieth century A.D. If time "flew" for the boys in the chariot days, it is certainly jet-propelled for us.

Nothing makes me quite so conscious of the speed with which tempus is fugiting as the frequency with which these annual Christmas-shopping sections of "Camera Trails" roll around. This is the third one, yet it seems as though I was working on the first one just a few weeks ago.

Actually, I know there has been a great deal of time between. This is being written more than a thousand miles away from where last year's December section was typed, and nearly twenty-five hundred miles from where the 1946 one originated. Still, it just does not seem possible that time has passed so swiftly.

WHAT TO BUY

Now for those questions about what to buy along photographic gift lines this Christmas.

Two years ago there were still vacant spaces on photographic supply store shelves, due to wartime shortages. Last year there was only an occasional empty spot where a shortage had not yet been made up. This year, I think it is safe to say that the camera fan can find any kind of supplies or paraphernalia his heart can possibly desire. The main problem is to bring his wishes and the contents of his purse into a workable partnership. Like the prices of everything else, those attached to camera supplies are high. Whether the price of any one particular item is too high is a matter for the individual purchaser to decide for himself.

What should you buy for a shutterbug husband, son, brother, nephew or uncle—for a camera-conscious wife, daughter, sister, niece or aunt? And what would you like, yourself?

There are several factors to consider. First, how much can you afford to spend? Second, how far advanced in camera-craft is the prospective recipient? Is he or she a box camera beginner, or has the hobby advanced well beyond the snapshot album stage? Third, what sort of equipment is used, and what additional gadgets are needed? Fourth, what about the darkroom angle? Does your photo-fan go in for developing and printing, or does he take all his stuff to a professional photo-finisher?

Having answered some or all of the above, we are ready for the next step.

Suppose the person for whom you are buying this gift does not have a camera and cannot really be called a camera fan. You want to get him started by buying him a camera. What kind?

You have a vast field to select from. You can spend a single dollar or several hundred of them, but, in the case of the beginner, neither expenditure would be wise. The dollar camera would be too cheap—too limited in its scope—for satisfaction. The three or four hundred dollar job, on the other hand, might be too bewilderingly complex, while its very expensiveness would discourage experimentation.

In writing the previous paragraph, I realize I am inviting letters of protest from folks who use inexpensive cameras. Sure they get good results, sometimes better than those obtained with high-priced cameras. But there are limits to what a single-lensed, fixed-speed and fixed-focus camera can do. I prefer a little more versatility.

All right, how much should you spend for a first camera? I would say anywhere from twenty to eighty dollars, depending on what you want. That is a rather wide range, I will admit. But within it you will find cameras of the box or bellows style,

This picture, taken by Tod Swalm and titled "Swamp Water," was one of those entered in last year's Chicago International Exhibition of Nature Photography. Deadline for entry in the 1949 exhibit is January 17.

reflex or with a between-the-lens-type shutter, capable of taking pictures at a variety of long and short ranges, at a number of assorted speeds. You will find miniatures using 35mm film, and possibly those capable of making almost postcard-sized exposures. It all depends on what you want.

As for extra equipment for friends and relatives already equipped with a camera, find out, if you can, just what troubles your fan is having. If it is over- or under-exposure, perhaps a chart, a guide, or even an exposure meter will help. If he wants to take closeups, investigate possibilities of an auxiliary lens. If he wants striking effects with light and shadow, look into the matter of filters.

He may need a tripod, or possibly just a steadier, more versatile head for the one he already has. Maybe a cable release will cushion the jar that often occurs when the thumb presses too abruptly on the trigger.

The photographic darkroom is another source of gift suggestions. Personally, the more I see of photographers and photography, the more I am convinced that everyone who wants something special from his hobby should be his own finisher. There is more to photography than just picture-taking. Actually, the secret of good photography lies not so much in the original exposure as it does in what happens to the film after it is exposed.

Frankly, I think you will be doing any cameraman a favor if you get him started toward his own darkroom.

It is not necessary to have an elaborate, light-tight alchemist's den in which to develop and print pictures. You can do it in the kitchen after dark, or in the bathroom. Sufficient light can be excluded from either room, just by pulling window shades and closing doors. You have running water—so what more do you need? Nothing—but equipment.

There are numerous kits for the beginner. Every major photo-supply manufacturing house puts out at least one. Then, after he has learned the mysteries of "hypo" and "developer," of sensitized paper and contact printing, (Continued on page 550)

ARE WEEDICIDES WISE?

(Continued from page 540)

soil. Its background of more than 25 years has been told in the treatise: "Streamlined Soil-Building — A Synthetic Topsoil." The concept of such a soil was suggested by Nature's own technique of producing virgin soil from the primary rocks through the interminably slow process of weathering. Again, since vegetation, on analysis, shows the presence of phosphates, sulphates, carbonates and chlorides of potassium, calcium, magnesium, sodium, and iron, among their major elements, it seemed no mere accident that *normal* virgin soil, such as may occasionally be found on mountain slopes undisturbed since its formation, contained these substances in well-defined proportions.

The restoration of fertility, the increase in yield and quality of crops, constituted our first interest in the application of Normal Soil. Our objective was not only more food, but crops containing a greater proportion of minerals and vitamins. This has been achieved to a gratifying degree.

An important "by-product" of our Normal Soil program is the soil-conditioning effects whereby heavy clay soil becomes mellow and friable, making for porosity and normal drainage; also conferring on loose, sandy soil the indispensable water-holding property to prevent washing and leaching of minerals.

Coincidentally with the achievement of our objective, the production of crops with superior flavor and keeping qualities, we were most agreeably surprised to observe that as the topsoil of originally unproductive land became *normalized,* noxious weeds, such as quack grass, bindweed, and Canadian thistles, which had overrun the land, disappeared automatically. The phenomenon was remarkable for the fact that even when Canadian thistle seeds were distributed on our ground in the fall the seeds failed to take root. The involuntary weed control, it goes without saying, made a deep impression on us, suggesting that there must be an inherent, basic factor involved that merited further investigation.

We evolved the tentative theory that noxious weeds developed only in topsoil that was completely unbalanced with respect to the fifteen major soil components. If our hypothesis was correct, it must necessarily follow that noxious weeds, and particularly the deep-rooted perennials, must forsake soil that has become *normalized;* that is to say, in cases where the fifteen major elements of the topsoil have been brought into normal proportion with each other, such as may be discovered in primitive natural soil.

To give our tentative theory of *weed-control by normalizing the soil* a thorough-going test, we have deliberately, over the years, planted root stocks of quack grass in our Normal Soil. Quack grass simply will not grow in this environment. We have repeatedly tried the same experiment with the densely rooted bindweed. This pest, likewise, indicates that Normal Soil is not its native habitat. The same experience has been met with in the case of other deep-rooted perennials. The definite conclusion, confirmed over many years, is that noxious weeds will not grow in soil where the fifteen chief elements are in equilibrium. Once the topsoil has become *normalized,* the disappearance of noxious weeds is permanent. The tiller of such soil need concern himself no longer on that score. Is not such a program more rational than to poison the soil with chemicals year after year as must be done by chemical sprays?

But what about the 'innocuous" weeds, the shallow-rooted wild grasses and other varieties? It is frankly admitted that these do, indeed, grow in Normal Soil. Their occurrence is a mark of fertility, for where such weeds will not grow it may be taken for granted that nothing else will thrive. It seems to be a fundamental law of Nature for fertile soil "to vegetate"—*to bring forth.* Fortunately, these shallow-rooted weeds are easily controlled by ordinary cultivation required to keep the soil mechanically fit for crop growth. We are, of course, referring here to garden and row crops. Where seed has been broadcast, or drilled as for grain, the root systems of the crop soon make it impossible for weeds to compete for plant food. Thus, in a *normalized* topsoil, weeds constitute no serious problem, for they do not crowd out the growing crop.

From the foregoing it should be plain that we object to the employment of chemical poisons as weed eradicators on scientific grounds: that they destroy living organic matter within the topsoil; that the introduction of chemicals foreign to plant growth must inevitably contribute to a serious disturbance of Nature's balance of nutrient elements within the soil; that Nature herself will automatically disperse noxious and deep-rooted weeds when we cooperate intelligently with her. That is to say, the proportion of the fifteen major soil components will compare with the status of these nutrient elements such as found in *normal* virgin soil. This concept of the soil status is admittedly unique with all—except Nature herself!

Our experience with the rational control of weeds has proved the soundness of William Penn's observation: "It were happy if we studied nature more in natural things; and acted according to nature, whose rules are few, plain and most reasonable."

Nature on the Air

Announcement is made by WNBC, National Broadcasting Company New York station, of fifteen minutes of Nature on the air, a program conducted by Ivan T. Sanderson and broadcast Monday through Friday at 9:15 A.M., Eastern Standard Time.

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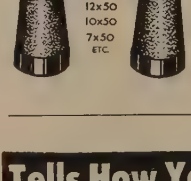

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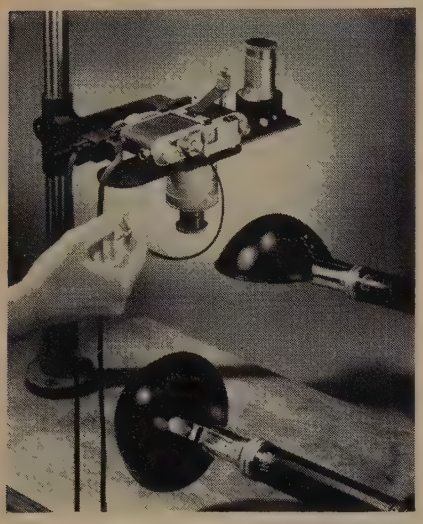
N. W. SCHOOL OF TAXIDERMY, 811Z Elwood Bldg., Omaha 2, Neb.

CAMERA TRAILS

(Continued from page 548)

he can go on to larger realms. I mean that literally. With an enlarger he can do many things with a single negative. He can enlarge the whole negative, or only a section of it. He can "dodge" out certain areas and "burn in" others. With various kinds of papers he can get vastly different results; with toners he can modify the textures and the color tints. He can "compose" and "edit," "blow up" or "crop."

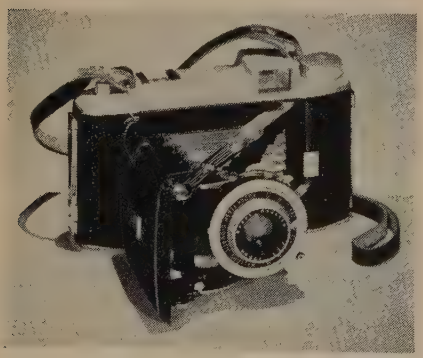
All this, of course, means additional gift possibilities. You can buy chemicals or paper with the comfortable sureness



Synchronized triple flash unit which is an accessory to the Leica camera.

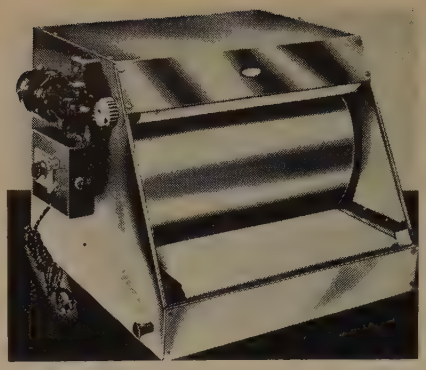
that they will be welcomed and used. Trays, paper cutters, a dodging kit, masks, ferrotype plates, print driers, safelights, timers, film tanks, tongs—all these and many more find ready use in the home darkroom.

Nor should we forget gifts of film, be it black and white, color, or, occasionally, infra-red. Flash bulbs, batteries for flash



Eastman's new Kodak Tourist Camera is available in three models as a gift.

guns, photoflood bulbs, flood lamps and reflectors—they are all usable and welcome. Just be sure the particular item you are getting is the right size. One cannot squeeze a 2½ x 2¼ film into a 35mm magazine, nor use a filter that is too large or too small to fit the lens. You



This electric Drum Dryer is a product of Fedco Products.

would not buy shoes to fit Dad and give them to Junior, so do not buy misfits for his camera, either.

In so far as trade names, labels and manufacturers are concerned, I have avoided mentioning them specifically. The accompanying illustrations are so identified, but they have been selected at random. If you want specific information, write in with your question—or, if time does not permit, consult the chap in the photographic supply store, or in a department store camera section. Get standard equipment at regular camera stores and you will never go far wrong.

CHICAGO CLUB EXHIBIT

Here is a suggestion for all Camera Trailsmen. The Nature Camera Club of Chicago has announced its fourth annual international exhibition of Nature pho-

FH Home Developing and Printing Kit is fully equipped and a valuable gift idea.

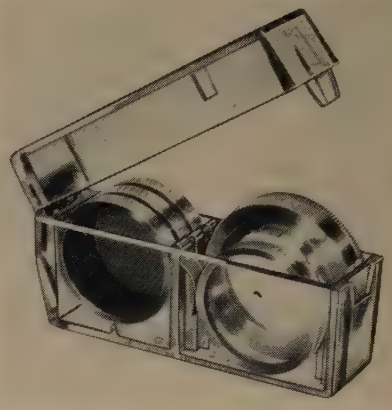
tography. These are the particulars, quoted directly from a letter written by H. J. Johnson, exhibition chairman:

"The Fourth Chicago International Exhibition of Nature Photography will be held Feb. 1-28, 1949, at the Chicago Natural History Museum. There will be divisions for prints and slides, with classifications in each for animal life, plant life, and scenery. Medals and ribbons will be awarded in each classification.

"Deadline for entries is Jan. 17, and entry forms may be obtained from H. J. Johnson, 1614 West Adams, Chicago 12, Illinois.

"This is the largest exhibition of this type in the world. One of its unusual features is that all contributors receive its Exhibition Bulletin, published several times a year and explaining the mechanics of exhibitions, giving tips on Nature photography, etc."

Mr. Johnson also wrote: "Last year, in reference to our Nature photography exhibition, you pointed out the value of such exhibitions to conservation. You probably will be pleased to know that we discussed your comments and as a result decided that one of our monthly



Plastic "Filter Safe" made by the Tiffen Manufacturing Company in two sizes.

meetings each session henceforth will be devoted to 'Conservation'."

Chairman Johnson, I am not only pleased, I am delighted! Conservation is a cause that never grows old . . . or stale . . . or dull . . . or needless. Again I salute the Nature Camera Club of Chicago, and its motto: "To make the naturalist a better photographer, to make the photographer a better naturalist."

CLOSING WISH

And so, another Christmas-shopping section has rolled off the typewriter.

Here is a hearty wish for a Merry Christmas and a prosperous New Year to all.

Managing Wildlife

Wildlife Management. By Reuben Edwin Trippensee. New York. 1948. McGraw-Hill Book Company. 479 pages. $5.00.

This is another volume in The American Forestry Series being brought out by McGraw-Hill under the consulting editorship of Walter Mulford. As the author says in his introduction: "The field of wildlife management has many sides and many angles. Fundamentally, it is the process of making land and water produce sustained crops of wild animals. The goal is clear and definite, but the roads toward that goal are several and follow numerous byways." It is the author's aim, therefore, to name the goal, and, in this excellent textbook, to chart the main highways and the byways to its achievement.

THE READER'S MARKET

A place where members of the American Nature Association and readers of Nature Magazine may find many interesting offerings or may advertise themselves, at low cost, for things wanted; things they have for Sale, for Trade, for Sale or Trade. This is an excellent forum for acquiring or disposing of such items as binoculars, books, cameras and photographic equipment, magazines, sports and outdoor equipment, etc.

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4. *Rates:* All classified advertisements must be accompanied by remittance. The rate is 15c per word including name and address—minimum charge $2.00. Cash with order.

5. *How to count numerals, etc.:* Groups of figures are counted as one word. Abbreviations consisting of initials or single characters likewise are counted as one word. Hyphenated words are counted as two words.

6. *"For Sale" ads must state prices:* A specific price must be stated on all FOR SALE ads —except that the phrase "write for catalog" may be used when listing real estate or merchandise in quantities.

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8. *Non-specific phrases barred:* Phrases such as "highest" or "top prices paid", as well as any other so-called "auction-type" phrases are not acceptable. The terms "fair price paid" or "state price wanted" may be used.

9. *Blind ads not acceptable:* Box number or blind ads will not be acceptable. Give your complete name and address to insure prompt delivery of all mail or telegraph replies.

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11. The association will not accept for publication in NATURE MAGAZINE, advertisements of firearms, ammunition, or patent medicines.

12. *Responsibility for illegible copy:* Type or print advertisement plainly as we cannot be responsible for errors due to illegible writing.

13. *Closing date:* The closing date of all advertisements is the 20th of the second month preceding month of issue.

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BOOKFINDERS! (scarce, out-of-print, unusual books) Quickly supplied. Send wants. Clifton, Box 1377nm, Beverly Hills, Calif.

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"Christ's Birth and Genealogy," 25c. BULLETIN, Box 87-N, Cathedral Station, New York 25.

BIRDS OF ZAVALA COUNTY, Texas. Rio Grande Plains habitat. 66 pages describing, illustrating 133 species, $1.00. John Holdsworth, 210 W. Nueces, Crystal City, Texas.

NATURAL HISTORY, Geology, Astronomy and Gardening Books, out-of-print. Free catalogues. Send Wants! John Johnson, Box 248, Mount Vernon, N. Y.

144 SIMPLE, INTERESTING EXPERIMENTS in the "HOW BOOK OF SCIENCE." Contains scientific knowledge for making many useful articles. $1.25 postpaid. Standard Science Supply Co., 1232 N. Paulina, Chicago 22, Illinois.

BOOKS. OUT-OF-PRINT. Hard-to-find. Any book. Banker Book Co., Dept. 16, Sherman Oaks, California

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CONIFER - LILY - RARE Seeds. Bulbs, Jade Orchid Cactus. House Plants. Catalogue free. Ransom Seed Specialists, San Gabriel, Calif.

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ALL DIFFERENT: 20 North American, including Papilios, Parnassius, Argynnis, $2.00; 20 Amazon Valley, including Blue-Morpho, $2.25; 25 Indo-Australian including rare Papilio paris, long-tailed leptocircus $2.25; 35 World exotics, including the gorgeous Urania raphaeus, leilus, fulgens, $5.00; The Leaf, Map, Owl, Glass-wing, Figure-eight, Bird-wing, Orange-tip butterflies for only $4.00! Just arrived, 10 from Africa $3.00; 10 from Java $2.00; Famous Brazilian Huge Bird-eating Spiders, six inches, mounted in Riker-Mount, $4.00; Postage 20¢ extra, all orders. Michael's, 7415 3rd Avenue, Brooklyn 9, N. Y.

INTERESTED IN BUTTERFLY BARGAINS, Rikermounts for school displays and collections? See our large display ad on page featuring many great butterfly bargains. Butterfly Art Jewelry, 289-91 E. 98th St., Brooklyn 12, N. Y.

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TELESCOPES, BINOCULARS, microscopes—big bargain catalog free. Brownscope Company, 24 West 45th St., New York, N. Y.

INDIAN CURIOS

4 FINE ANCIENT INDIAN Arrowheads $1.00. Stone Tomahawk $1.00. Flint Skinning Knife, 50¢. Spearhead, 50¢. Peace Pipe, $5.00. List Free. Lear's, Kirby, Arkansas.

MINERALS

"SERMONS IN STONES." Arizona rare minerals. Collectors or museum grade, 12 miniatures, assorted, colorful, brilliant, genuinely rare, $3. Sam Parker, 620 North Third St., Phoenix, Arizona.

MISCELLANEOUS

KEEP YOUR BIRDS all winter by preventing their drinking water from freezing. Send stamp for circular. Tifft, 202 Tifft Road, Dover, New Hampshire.

PINE KNOTS FOR your Christmas Hearth! Naturally-seasoned sugar pine knots from California's Sierra Forests. Each two feet long, about eight pounds, burns brilliantly for hours. Decorated with green moss and pine cones in natural state. $7.50 prepaid anywhere in United States. COTTAGE SHOP, 1107 South Baldwin Avenue, Arcadia, Calif.

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POEMS WANTED

POEMS wanted for musical setting. Send poems for FREE examination. Hamann Service, 590 Manhattan Building, Milwaukee, Wisconsin.

RAINCOATS

PRACTICALLY NEW ARMY RAINCOATS—Excellent condition—medium weight—money back guarantee, $2.50. Pay when received. Buford Butts, Sharon, Tennessee.

SEA SHELLS

SEA SHELLS appeal to Nature Lovers. Try these offers today; 12 Attractive Land Shells, $1.00; 12 Marine Shells, $1.00; 5 Odd Marine Specimens, $1.00. List of beautiful polished and unpolished shells on request. Mrs. F. K. Hadley, Box 33, West Newton, Mass.

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ANIMALS & BIRDS MOUNTED by O. D. Cole, R#1, Wisconsin Rapids, Wisc.

OOKPIKJUAK, THE LONELY

(Continued from page 516)

the Eskimos' summer encampment huddles companionably about the neat, red-trimmed buildings of the Post, Ookpikjuak veered suspiciously far inland. But he soon circled back to the shore, for the frozen bay and the wind-swept ridges were part and parcel of his lonely being.

Why one little stretch of hummocky tundra and a chain of scattered lakes should look any more desirable than another is a matter that only a bird can understand. Yet Ookpikjuak knew, and settled upon a rocky promontory with a deep booming croak, *"kroh-go-go-gok,"* that proclaimed to all who might hear that this land was his, for home and hunting ground. Across the barrens there were answering booms, and he could see an occasional white form coursing over the distant meadows, but his territory remained unchallenged.

Whence She came he never knew, but one bright morning he found her sitting demurely on his favorite hummock, watching him with quiet, yellow eyes. To the lonely Ookpikjuak her soft white plumage with the delicate tracery of brown was more beautiful than anything he had ever beheld. Flying to a nearby boulder, Ookpikjuak lifted his head to the sunny skies, filled his throat with the crisp spring air until it was ready to burst for joy, and welcomed her with a series of solemn bows and low, resonant booms. Gravely She bowed in reply. Ecstatic, he jerked his tail upward until it almost brushed his back, bowing violently, hooting his deep boom of joy, bowing and booming, bowing and booming.

It was She who decided to build their nest upon the grassy hummock where they had met. It was She who scraped out the shallow depression and added the soft bits of reindeer moss and feathers that made the scant lining. Ardently he brought her every lemming he could find, and a rich assortment of the shore birds that were flooding the marshy meadows with new life. With feverish devotion he kept her sleek and fat while She brooded the five white, oval eggs. In time life's eternal cycle began anew, and there were five downy chicks peeping for food.

But the sun that had warmed the lonely heart of Ookpikjuak was hidden all too soon. Thunderheads were forming over the ice floes of Hudson Bay, and day after day a cold rain pelted the tender young birds of tundra and marshes. On the wind-swept hummock the shallow nest of the owls filled with water and one by one the owlets chilled and died. Oopikjuak eyed them in silent anguish, but She was inconsolable. For two days She sat desolately upon the lifeless bodies. Then with a low hoot She sailed across the distant meadows and did not return.

And so the summer passed, as lonely as before. Again the birds moved southward, and again Ookpikjuak drifted down the barren coast and over the forests to the sand dunes of Michigan. Again he returned with the spring, drawn by an instinct stronger than hunger or fear, to the grassy knoll that had brought only misery.

What invisible magnet pulls a bird back from a thousand miles of woods and lakes and meadows to that infinitesimal plot that he recognizes as home? She, too, returned, his lovely mate, and again Ookpikjuak wooed her and hunted for her while She warmed the white eggs beneath her downy breast.

But the lives of the wild folk are fraught with peril, and Ookpikjuak was not destined to feed her young. Before the eggs were three days old a party of Eskimo boys wandered up the coast from the settlement. They carried small pails and their eyes were keen, for they, too, were hunting for food. As they topped the rise Ookpikjuak sprang into the air and circled conspicuously high over their heads, hooting a deep angry *"kroh-go-go-gok."* Then he soared far down the distant meadow, eyeing them balefully over his shoulder. But the Eskimo boys were not misled by his ruse, for they had hunted the greater part of their young lives, and he who does not learn the ways of the birds and beasts goes hungry in the North. Scattering out across the tundra they tramped in orderly circuits, taking their bearings by the willow twigs around the pools and the irregularities of the rocks that are signposts of the Barren Lands.

Suddenly She, too, was in the air, darting menacingly at one of the boys, circling his head with an angry rush of wings and furious snapping of her vicious beak. The boy promptly stood in his tracks. With a last abrupt dive on folded wings until her sharp talons grazed his cap, She veered toward the meadow to play her last trump. Flopping into a snowbank in the shadow of the ridge, She waddled awkwardly in irregular circles, dragging her wings and bellying in the snow, hobbling forward, flapping and falling, whining and barking feebly. With a great surge of wings Ookpikjuak joined her on the snowbank. But again the young Eskimos were unimpressed. The four boys worked in toward the lad who had flushed her, and soon one of them was waving his hat from the top of the nesting knoll.

She saw him first, and was over his head like a thunderbolt. But meat was scarce at the settlement and the bow was ready. A twang of his sealskin bowstring and the beautiful bird lay quivering at his feet. With a croak of despair Ookpikjuak sailed across the marshes and lakes to the farthermost ridge.

Thus another summer came and went, lonely, as always. That year the lemmings were plentiful and Ookpikjuak had no need to leave the Northland with the coming of the snows. And so he hunted over his solitary domain through the long months of winter, resting by night in the lee of a snowdrift, coursing the frozen marshes by day.

When spring came again to the tundras the Dark Lady drifted into his territory, a young bird of last summer's brood, heavily barred with brown. Ookpikjuak accepted her casually, for the race must be perpetuated, but the light had gone out of his heart when She fell at the feet of the Eskimo boys.

And so the years have rolled by, good years and lean in their turn. Some seasons the owls have reared their young successfully, in others the rains and their incessant enemies have taken heavy toll. The Dark Lady has been replaced in turn by several others, for even the wary may meet with disaster, but Ookpikjuak, the Lonely, has become more shy and solitary with the years. The Eskimo boys have invaded his domain many times, but they can never approach him within a hundred yards. And if you should tramp, some crisp June morning, up the barren coast of Hudson Bay, you might see him, a white dot sitting watchfully on the highest promontory of the rocky shore. You could not mistake him, for his eyes are as fierce and yellow as in his nestling days, although he is almost pure white now, the handsomest owl that ever coursed over the tundras of Keewatin.

METEOROLOGICAL MEDLEY

(Continued from page 520)

barometric high pressure area somewhere in the Rocky Mountains or in the high plains areas. When they arrive, sensible Texans change their high-heeled boots for galoshes, their fancy embroidered shirts for overcoats, and stay indoors as much as possible. A 40-degree drop in temperature overnight as the result of a norther is not at all unusual.

While most of Texas is flat prairie or high plains, the Trans-Pecos region is a plateau 3000 to 5000 feet high, with several peaks climbing considerably more than a mile into the air. The highest point in the state, Guadalupe Peak, has an altitude of 8751 feet, while four other Texas mountains are higher than any peaks east of the Mississippi. Considering that the state begins at sea level on the coast, such altitudes are not to be sneezed at. Naturally, this sea-level to mountain-top range has a definite influence on the state of the weather.

Thus, Texans can claim almost every kind of weather—citrus weather and cereal weather, deluges and droughts, sunshine and snow, dust storms, when tons of top soil travel by wind power, and wet spells, when whole counties become vast mud puddles.

Texas weathermen deal out hurricane warnings, frost warnings, flood warnings, and carefully worded hints of possible tornadoes. People freeze to death in winter and die of heat prostration in summer.

There is every possible kind of temperature, pressure, humidity and—as for precipitation—there are rain, snow, hail, sleet, fog drizzle and downpour. Fabulous, fantastic and flabbergasting—that is Texas weather.

THE WHITE DWARF STARS

(Continued from page 542)

ing state and then rotate in an unstable manner. This may lead to the phenomena of recurring novas, in which outbursts of a minor nature take place in which matter is ejected from the stars at recurring intervals, and to greater catastrophic outbursts of the supernovas. A theory contrary to that of Eddington's on the origin of the white dwarfs considers that they originate as a result of the recurrent nova and the super nova outbursts, being formed of the portion finally remaining after most of the substance of these collapsing and rotationally unstable stars has been ejected to infinity. The large amount of hydrogen known to exist in the companion of Sirius, estimated to be as high as sixty percent of its whole substance, is assumed, by this theory, to have been acquired gradually by accretion of interstellar hydrogen, which exists so abundantly in interstellar space. This theory of the origin of the white dwarfs from recurrent novas and supernovas appears to be, at present, the one that fits in better with what is known observationally and statistically concerning these extraordinary stars.

During December most of the planets will be poorly placed for observation. Mercury will be in superior conjunction on December 12 when it will be in line with earth and sun, with the sun between the two planets. It will then pass from the morning to the evening sky, but, on account of nearness to the sun, will be lost to view until toward the end of the month. Venus is still a fine object in the eastern sky before sunrise, but it is now only about twenty degrees above the southeastern horizon at sunrise and is approaching the phase of the full moon and superior conjunction. Mars is in Sagittarius in December, and is very poorly placed for observation in the evening sky. It is low in the southwest at sunset. Jupiter is also in very poor position in the early evening sky. It is in Sagittarius, a few degrees west of Mars and in the southwestern sky, too close to the sun to be seen most of the month. Saturn is still in Leo, where it has remained throughout the year. It is a few degrees to the east of Regulus and will ri e before midnight and be visible the remainder of the night.

The shortest day of the year will occur on December 21. The sun will be at its farthest distance south of the equator on December 21, 5:34 P.M., Eastern Standard Time, when winter will begin in the northern hemisphere and summer in the southern hemisphere.

Wildlife Poster Contest

"Soil and Water—and their Products" will be the theme of posters entered in the National Wildlife Federation's conservation poster contest closing January 15, 1949. This contest is open to all students in grades from the seventh through the final year of high school. Five hundred dollars in prizes will be awarded, the first prize being $250. Size of the design should be fourteen inches wide by nineteen inches long with a two-inch margin at the top and sides and three inch margin at the bottom. Posters may be done in either color or black and white, and in oil, watercolor, pastel, tempora, charcoal or scratchboard. Color is preferred. A conservation slogan should appear in the poster, but no other printed matter. Further details may be obtained from the National Wildlife Federation, Servicing Division, 20 Spruce Street, Boston 8, Massachusetts.

Boy Scout Week

"Adventure—That's Scouting" is the theme of Boy Scout Week in 1949, and the week of February 6 to 12 will be devoted to observance of the 39th anniversary of the founding of the Boy Scouts of America. During the 39 years, and as of February next, approximately 15,500,000 boys will have been Scouts, and the estimated membership in February will be 2,200,000. Scout Sunday will be observed on February 6, with religious services for Scouts of Jewish faith on Friday and Saturday, February 11 and 12. The aim of this year's observance is to encourage boys and men to join the movement, and help all Americans better to understand what the Boy Scouts are doing for their country.

Redwoods President

Duncan McDuffie of Berkeley, California, was elected president of the Save-the-Redwoods League at the annual meeting of that fine conservation organization. Mr. McDuffie reported that the League has received more than $150,000 in redwood purchase funds during the past year, and that in 1947 the League contributed $304,000 for acquisition of redwood forest land for parks, to match an equal amount provided by the State of California.

Swan Increase

Encouragement is found in the census figures for the number of trumpeter swans in the United States, which the U. S. Fish and Wildlife Service report as totalling 418 birds in their only known habitat in this country—the Red Rock Lakes—Yellowstone Park region. This is an increase of 68 birds over the 1947 figure and a substantial comeback, proportionately, from the low of 73 in 1935. Thus, it is hoped, this bird is saved from joining the sad list of extinct North American birds.

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EARTHBOUND

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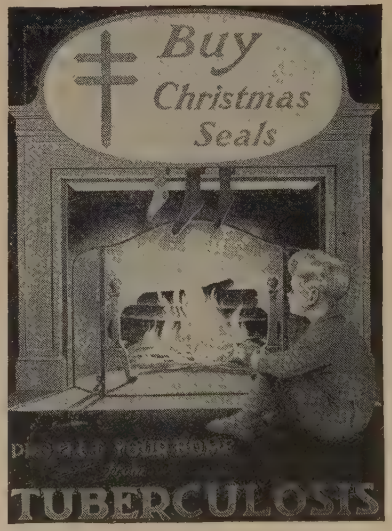
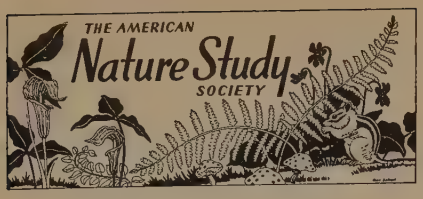




RESOURCE-USE EDUCATION

BY RICHARD WEAVER

Program Director, North Carolina Resource-Use Education Commission

IN A region of the United States where the population is growing rapidly, and yet where the annual income is far below most other areas, Resource-Use Education was born and has rapidly attracted the attention and support of educators and conservationists.

The South has long supplied many of the raw materials—lumber, minerals, cotton, peanuts, rice, etc.—for Northern industry. Recently industry has greatly increased in the South in order to tap the large labor supply and to be nearer the resources on which it depends. The South has likewise relied heavily on ideas and monies from other areas to strengthen its inadequate educational system. However, in the last decade, national leaders have witnessed in the South a grass-roots movement in education that can serve as an example for many parts of the country. Educators, physical scientists, and social scientists are working together to make the resources of the South serve the needs of the South and its people through a revitalized educational program.

Resource-Use Education has captured the imagination of many people who have wanted education to be more meaningful in the lives of people and communities. Numerous regional and state work conferences have been held where speeches were taboo and all the participants played an important part in the production of a group report and plan. State and institutional teams have worked at such conferences to develop plans that later blossomed forth into state programs. These programs then automatically have the support of the agencies and institutions sponsoring the conference.

In this respect alone, educators are looking to the South as the seed-bed of sound educational planning where democracy is demonstrated by achieving maximum group and individual production. Race, politics, or religion need not serve as barriers when the objective becomes one of maximum participation for the solution of common problems.

Resource-Use refers to how man draws on his environment—natural and social—to meet his life needs. These needs include such basic things as employment, food, shelter, clothing and recreation. Such things as schools, churches, clubs, government, industries, transportation, communication, and other services represent *social resources* designed to help people meet their needs. *Natural resources* such as soil, water, sun, plants, animals, and minerals are the raw materials upon which man must draw to meet his needs.

The technical skills and information required to manage and harvest the natural resources, and the attitudes of the people toward the resources are important parts of the culture in any region.

People—the human resources—are the most important resources in any region or country and their needs should be paramount. People can be wasted and eroded just as are soils, or they can become valuable assets in a growing community and their lives can become enriched through expanding opportunities.

Therefore, *Resource-Use Education* is the means by which we train people to use and develop the natural resources through the application of the best known technical skills and information, to fulfill their needs and those of their neighbors, their community, their nation, and their world.

Resources-Use, then, becomes a trinity—of developing natural, social and human resources in a unified pattern of planning and development. One resource develops simultaneously with the others. Plants and animals are produced for the benefit of people, people are educated to the inter-relationships of their environment and develop and conserve resources while using them, institutions are strengthened by rededicating themselves to the service of mankind and the perpetuation of the resources on which all civilization and living depend.

With the resource-use concept as large and as important as described above, it would be difficult to compartmentalize it into any grade, subject, or department. It becomes the property and responsibility of all—particularly the administrators and community leaders whose responsibility it is to see that education has a clearly defined and important objective. A part of that objective—and, to some people, the most important part—is that of developing citizens who understand the problems and opportunities of their community, state and nation; who are equipped to manage and develop its three types of resources, and who have a militant desire to see that all resources—human, social and natural—are intelligently used.

English, history, science, social studies, mathematics, agriculture, homemaking, health teachers, and others all have a contribution to make. Their courses of study are usually designed to assist them in reaching the objective described. Frequently they are bogged down with the mechanics of teaching the subject and lose the emphasis needed to make the information applicable to the important problems of individuals, communities, and nations.

Therefore, resource-use becomes an emphasis which strengthens our educational objective; at the same time, it enriches our teaching with pertinent, interesting, colorful, and dynamic subject matter. Frequently these are lost when the information must be closeted in national texts. This places a premium on such resourceful teaching techniques as films, observations, field excursions, experiments, group discussions with resource people, local sources of materials, reports, and facts, community surveys, community projects, soil erosion projects, etc.

Classroom and school projects, which are problems centered around important needs of people and communities, then become the focal point around which texts, references, films, and trips can be centered. Children learn to work in smaller groups, leadership emerges, interest is heightened by a spirit of research, and the scientific method becomes a reality and an important tool for learning.

As one of the numerous state resource-use education programs in the South, North Carolina has pioneered a special type of organization known as the North Carolina Resource-Use Education Commission. It is composed of representatives of the fifty state agencies and institutions concerned with the development of resources in the state. An Executive Committee of eight and a staff of two people develop and guide the program. Eight teacher-training institutions — four white and four Negro—are serving as Area Resource-Use Education Centers. Each institution has a faculty committee and an area advisory committee on Resource-Use Education. The latter is composed of local representatives of resource agencies. Each area is working with ten or more participating schools which are engaged in specific resource-use projects. These schools rely on the help of the sponsoring institution and agencies.

Summer workshops, college courses, curriculum evaluations and changes, specific projects in Demonstration Schools, off-campus courses and clinics, and numerous area conferences, are all used in the promotion and development of the resource-use program. Bibliographies, guides and workshop reports are being produced to help other schools and teachers begin their programs. Recently a state work conference was held in which one hundred and twenty educators and resource specialists worked and planned together for three days in developing plans for the eight area centers.

Further information and material describing this program are available from the Program Director, Richard L. Weaver, P.O. Box 1078, Chapel Hill, N. C. Dr. Weaver also serves as Secretary-Treasurer of The American Nature Study Society.

Under the Microscope

By JULIAN D. CORRINGTON

HISTORICAL OUTLINE

Our previous discussion took up distinctions between predators, commensals, symbionts, and parasites in the relationship of one species of plant or animal to another. The point stressed was that these are artificial concepts that grade one into another or overlap, bringing up the topic of the evolutionary origin of the parasitic habit.

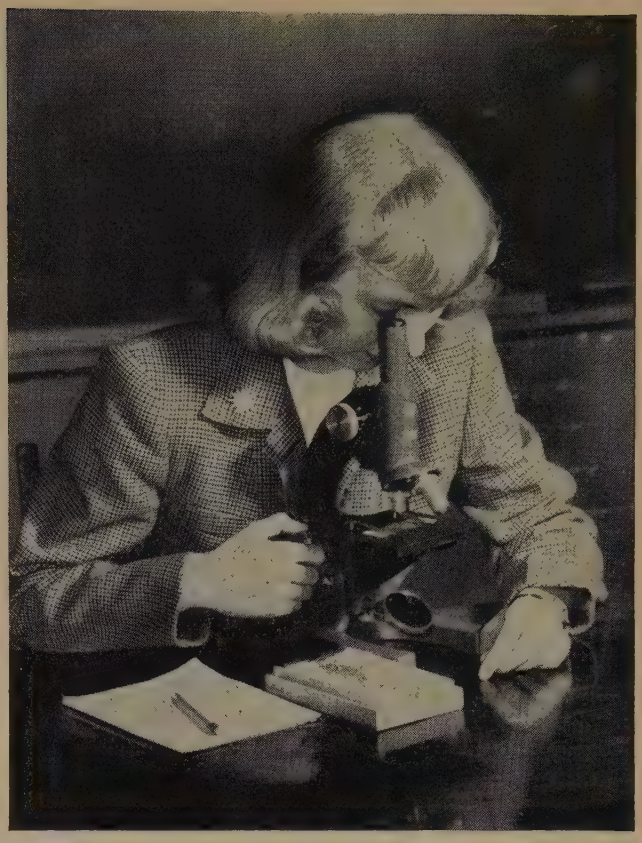
A flatworm may forsake its independent struggle for existence and adopt the habit of living on the body of a fish, finding the best place to be just back of the gill opening, where it receives a current of water carrying minute food particles. This mode of life neither benefits nor harms the fish and we then dub the worm a commensal. Later, a few members of this worm species may find an easier and more certain livelihood should they change their feeding habits again so as to nibble the mucous secretion covering the fish. Here is a lazy life indeed—to live in a stratum that consists of food, like the fairytale children dwelling in a gingerbread house. Shall we now regard these worms as parasites or commensals? You may take your choice.

Still later, some of the worms move into the gill opening, where they find protection from currents, from being eaten or brushed off, and where environmental conditions are more or less uniform. They continue to eat the mucous secretion, but some of them perchance bite too deeply and obtain a bit of gill tissue and blood. This is a far richer food, and these worms prosper so well that through natural selection they alone who have advanced to this definitely parasitic habit survive and leave progeny. Finally, some of their descendants move on down the alimentary canal and eventually take up residence in the intestine, or ascend the bile duct so as to inhabit the liver.

It is through some such history that most of our species of internal parasites have become established in their highly peculiar environment. The account is greatly oversimplified and does not detail the many problems the worm must meet and conquer in order to adapt itself. It must develop a cuticle that will be impervious to the digestive juices of its host. It will have no need for sense organs or much in the way of locomotor structures, but will have to organize an elaborate reproductive system and solve the difficulty of enabling the offspring to find new hosts of the same sort.

The true bugs are characterized by having the mouthparts in the form of a sucking proboscis, ordinarily employed to extract juices from plant tissues. On some ill-starred former occasion, one of this crew tried out his hypodermic needle on the human cuticle and found it worked beautifully, the juice secured being far richer than that from any plant. Such external parasites as the bedbug, kissing bug, mosquitoes, and biting flies doubtless acquired their pestiferous habits more or less through chance encounters in this manner, while others, as lice, fleas, and ticks, are more profoundly modified and have undergone a much longer evolution through graduated stages.

There is in Nature a well-known law in parasitism—the properly adapted parasite follows the adage of live and let live, and does not kill its host, for to do so results in the death of the parasite as well (internal species, as worms), or loss of the host as a dwelling and feeding place (external species, as fleas). The parasitologist can tell, in a general manner, about how long a parasite has existed as such from the effect it has on the host. That tapeworms are very old hands at this game is known not only by the profundity of their structural modifications, but also by the fact that, ordinarily, they do not kill or seriously injure the host; the two organisms have evolved together to a point of at least mutual tolerance. By contrast, *Trichinella spiralis*, the worm that produces trichinosis in man, is undoubtedly a more recent acquisition of the human internal menagerie, since infestations in civilized peoples today result in the death of all of the larval worms and not infrequently of the human partner as well.



Trying out the new Bausch and Lomb Student Microscope is Marion Savage of the optical firm's training department. This instrument is the new model FL, the "F" for "fine quality" and the "L" for "low cost."

BIOCENTENNIALS
Hugo de Vries, 1848-1935

In proportion to the tiny size of their home kingdom, the Dutch people have always contributed more than their share of eminent scholars and artists. One of these contributions was Hugo de Vries, born on February 16, one hundred years ago in Haarlem, and celebrated in our days as a botanist and biologist.

De Vries is always mentioned twice in even the briefest histories of science—for his discovery of mutations and for his rediscovery of Mendel's laws of heredity. He was known personally on this side of the Atlantic as well as in Europe, coming to America to carry on his researches as well as to lecture in some of our leading universities.

The life span of de Vries—the long one of 87 years—bridges the old and the new in biology, beginning in a philosophical and speculative era and ending in one of intensely objective and experimental approach. Born within the decade centering around 1848 were some of the most important builders of our times: Roentgen (X-rays) and Becquerel (radio-activity) in physics, Van't Hoff in chemistry, Koch in bacteriology, and the American inventors, Bell and Edison. Cells had been announced as universal biological entities just ten years earlier (1838-9) by Schleiden and Schwann, and detailed cell research

was getting under way, especially in the laboratories of Nägeli, Remak, and Kölliker. Biologists believed in a "life force," an intangible something that, like the force of gravity, was supposed to explain much; realism was replacing romanticism and, when de Vries was eleven years old, the *Origin of Species* appeared, to throw the entire philosophical world into a violent controversy.

One can readily imagine the confusion prevalent in the teaching of biological subjects in the years following Darwin's great treatise. What was the young mind to believe while the big shots bickered and railed? De Vries, the youth, attended the universities of Leyden, Heidelberg, and Würzburg and doubtless came under teachers who were for as well as those against the new doctrine. And the "bull sessions" that must have gone on among his fellow students,—alas, that we have no wire-recordings of them! As Omar so wonderfully phrased it, long ago:

> *"Myself when young did eagerly frequent*
> *Doctor and Saint, and heard great argument*
> *About it and about: but evermore*
> *Came out by the same door wherein I went."*

De Vries, however, was destined to do something about all these arguments, and to emerge through a new door. He made a name for himself by osmotic-pressure studies in plants, became a lecturer at the University of Amsterdam in 1877, and the following year, when but thirty years old, a professor. He remained at this position until his retirement in 1918—forty years of continuous service at the same institution. Then he went to live in Lunteren and to continue his experimental studies until his death on May 21, 1935.

De Vries' best-known works are *Intracellular Pangenesis* (1889), *The Mutation Theory* (German, 1900-03; English translation, 1910-11), and *Plant Breeding* (Chicago, 1907; German translation, 1908). In 1886 this Dutch botanist began his long series of experiments that led to his discovery of mutations and his rediscovery of the laws of heredity, which Mendel had published in 1866, but whose paper had been ignored and forgotten. De Vries decided to use the evening primrose, an American plant that had escaped from culture and was to be found growing wild in many European countries. Destined to provide the key to the missing chapter in evolution, this plant bore the prophetic name of *Oenothera lamarckiana.*

It would seem to be a foregone conclusion that if a scientist should use either faulty materials or methods, any conclusions he might reach would also prove faulty. The case of *Oenothera* is doubtless the most remarkable on record to show that this is not necessarily true: de Vries described a number of sudden and more or less drastic changes in characteristics of this plant, naming them mutations, and thereby introducing a concept that has become a cornerstone of modern biology. Thousands of times, over and over, in a huge number of plant and animal species, mutations have been described, predicted, and even manufactured; the law is as firmly established as any natural phenomenon;—yet subsequent work was to produce the astounding fact that the alterations de Vries saw in the evening primrose were not mutations, but merely recombinations of old characteristics already present. Today we know that mutations are gene changes, alterations of the germ plasm that arise within the organism, in many cases resulting in modifications of external appearance, and that they are fortuitous and without relation to the environment.

Darwin, in his explanation as to how evolution occurred, assumed his first two factors as being axiomatic. All animals and plants varied, yet all exhibited the characteristics of their kind; variation and heredity were universals that required no proof. De Vries was among those who were not satisfied by such assumptions and he set forth to provide the experimental proof as to the method of each of these factors. They have since become sciences in their own right, demanding and worthy of exhaustive study. His mutation theory stands today as a basic law. His work on the mechanism of heredity had been performed by another thirty-four years earlier, and so he was robbed of the chief credit for these researches, yet he labored none the less diligently and successfully, and was given wide acclaim when, in 1900, he published the results of his own experiments along with a republication of Mendel's thesis.

What a blow it must have been—to culminate a long series of carefully planned studies by discovering a great principle—only to find that someone else had gotten there first! It is a great testimonial to Hugo de Vries, the man and the scientist, that he could take this in his stride and go on to further labors and triumphs.

★

SONGS FOR THE LABORATORY

Battle Hymn of Evolution

Mine eyes have seen the optic and the auditory nerves,
The thalamus coördinates for all the parts it serves,
The cerebellum then will shake the tail in graceful curves,
As sharks go swimming on.

Gory, gory evolution,
Neuromotor execution.
Fitness is the sole solution,
As life goes marching on.

How nice to have a kidney that develops front to rear
And leaves behind its older ducts for reproductive gear;
With Wolff and Müller on the job no troubles need they fear,
As cats go leaping on.

Gory, gory evolution,
Blood will suffer no pollution:
Cats will show no diminution,
As time goes marching on.

INDEX TO NATURE MAGAZINE

January-December, 1948

(*Gen.* indicates a general article; *fig.*, a photograph or drawing; *rev.*, a review; *port.*, a portrait.)

ANTHROPOLOGY

Anatomy, Nervous System, 56 (rev.).
Comparative Physiology, 227 (rev.).
Gigantopithecus, 470, 471.
Homo sapiens, 527, 528.
Indians, prehistoric, 53 (rev.).
Man, Cave, 341.
  Cro-Magnon, 527.
  Java, 469 (fig.).
  Meganthropus, 470, 471.
  Mousterian, 527.
  Neanderthal, 525, 526.
  Pekin, 470 (fig.), 526.
  Skhul, 528.
Man, Early, 523-528 (gen., fig.).
Maya Explorer, 53 (rev.).
Neurology, Fundamentals, 336 (rev.).
Pithecanthropus erectus, 470, 471.
  robustus, 470, 471 (fig.).
Sinanthropus pekinensis, 470, 471, 526.
Skeletal Muscle, 54-55 (gen., fig.).
Skeleton Talks, 13-14 (gen., fig.), 50.
Superman, 469-471 (gen., fig.), 500.
Vertebrate Anatomy, 336 (rev.).

ASTRONOMY

Comet, 1947, 153-154 (gen., fig.), 157.
Constellation boundaries, 434-435 (gen., fig.), 494.
Heavens in 1948, 41-42 (gen., fig.), 52.
Home Planetarium, 46.
June-July Heavens, 322-323 (gen., fig.).
Mars, Life on, 99-100 (gen., fig.), 106.
Moon, Facts about, 485-486 (gen., fig.), 497.
Moon festival, 108.
New telescope, 285.
Pluto's Journey, 333 (rev.).
Seeing a Billion Light Years, 208-210 (gen., fig.), 218.
Stars, White Dwarf, 541, 553.
Sun and the Sea, 59 (rev.).
Telescope, Mt. Palomar, 208 (fig.). 209 (fig.).
Uranus, satellites, 322-323.
Venus, Greatest Brilliancy, 265-266 (gen., fig.), 272.

BIOGRAPHY

Appert, Nicolas, 112.
Bailey, Liberty Hyde, 314-316 (port.), 332.
Coates, Christopher, 361 (port.).
Daguerre, 156 (port.).
de Vries, 556.
Edison, T. A., Diary, 283 (rev.).
Evinrude, Ole, 165 (rev.).
Frank, Bernard, 137 (port.).
Horsfall, R. Bruce, 271, 332 (port.).
José, Paul, 68 (port.).
Oberholser, Harry C., 115.
O'Hearn, James A., 35 (port.)
Pack, Arthur Newton, 34 (port.).
Pack, Charles Lathrop, 34 (port.).
Palmer, E. Laurence, 35 (port.).
Preble, Edward A., 35 (port.).
Radcliffe, Harry E., 35 (port.).
Ridsdale, Percival Sheldon, 34 (port.).
Tarnowsky, Ivan, 137 (port.).
Thoreau, Henry David, 506.
Westwood, Richard W., 35 (port.).
Whiting, Agnes, 132 (port.).
Whiting, Charles, 132 (port.).

BIRDS

Albatross, 468.
  royal, 342.
Anhinga, 70.
Archaeornis, 206.
Audubon's Caracara, 473-474 (gen., fig.).
Auk. 257.
Bird Feeding station, 9-12 (gen., fig.).
Bird Life, Australian, 171 (rev.)
Bird luminosity, 103.
Birds, against Beetles, 240-241 (gen., fig.).
  Arctic Alaska, 318 (rev.).
Birds, Battlewise, 248, 272 (gen.).
  Field Guide, 283 (rev.).
  hibernation, 62.
  killed by spraying, 540.
  King Co., Wash., 115 (rev.).
  Malaysia, 53 (rev.).
  of prey, N. E. Am., 221.
Bittern, American, 70.
Blackbird, 175, 484.
  European, 248 (fig.).
  red-winged, 72, 240, 241, 368 (gen., fig.).
Black Wings, 58-59 (rev.).
Bluebird, 7.
Bluejay, 9 (fig.), 240.
Bob-white, 12, 240, 466.
Booby, 358-360 (gen., fig.), 386.
Brush-turkey, 245, 270.
Buzzard, 484.
Canary, 343, 487, 488.
Cardinal, 9, 11, 240, 241.
Catbird, 12, 240, 241.
Chaffinch, 175.
Clark's Nutcracker, 264.
Condor, South American, 247, 270.
Coot, 70.
Cormorant. 247, 276.
Cowbird, 240.
Crane, 94 (fig.), 95 (fig.).
  Manchurian, 108.
Creeper, brown, 12.
Crow, 240, 241, 247, 385, 483 (fig.), 484.
Curlew, 385.
  Eskimo, 257.
Dove, 95, 349.
  mourning, 425.
Duck, 7 (illegal hunting), 182, 271 (stamps), 468.
  black, 460.
  eider, 249, 251, 515.
  mallard, 231, 272, 460.
  redhead, 460.
  ringneck, 460.
  shoveller, 460.
  wood, 70.
Eagle, 484.
  bald, 70, 398, 491.
  golden, 500.
  Mexican, 473.
Egret, American, 70, 345 (fig.).
Falcon, peregrine, 500.
Finch, Cassin's purple, 317.
  rosy, 276.
Flicker, 12.
Flycatcher, alder, 251.
  crested, 240.
Frigate, bird, 359.
Frogmouth, Australian, 466.
Gallinule, 272.
  Florida, 70.
  purple, 70.
Game Birds, Guide, 381 (rev.).
Goldfinch, 175.
Goose, 63, 231.
  blue, 460.
  Canada, 457-460 (gen., fig.), 498.
Goshawk, 257, 484, 500.
Grackle, boat-tailed, 70, 72 (fig.), 205 (fig.), 206.
  purple, 12, 240-241.
Grebe, pied-billed, 70.
Grosbeak, evening, 317.
  rose-breasted, 12.
Grouse, 484.
  ruffed, 63, 467 (fig.).
  sharp-tailed, 484.
  Sierra, 264.
Grus japonensis, 108.
Guillemot, black, 251.
Gull, 83, 276, 468.
  black backed, 253.
  herring, 206, 251, 253 (fig.).
  laughing, 206.
  ring-billed, 69 (fig.), 206.
Hawk, 386.
  Cooper's, 12, 483 (fig.), 484.
  kestrel, 248.
  red-shouldered, 500.
  red-tailed, 182.
  sharp-shinned, 484.
  snail, 129-131 (gen., fig.).
  sparrow, 12, 248, 500.
Heron, 103, 276.
  black-crowned night, 32 (fig.).
  great blue, 483 (fig.), 484.
Hornbill, 247.
Hummingbird, 13, 392.
  black-chinned, 176 (fig.), 180.
  calliope, 178 (fig.), 179.
Ibis, 345 (fig.).
Junco, 8 (fig.), 12, 383 (gen.).
Kingbird, 240.
Kingfisher, 247.
Kinglet, 489.
  golden-crowned, 251.
  ruby-crowned, 12.
Kite, Everglades, 129-131 (gen., fig.).
Kiwi, 467.
Kookaburra, 476.
Laughing jackass, 476.
Linnet, 175.
Longspur, 513.
Loon, 291, 292.
Love bird, 343.
Magpie, 272.
Martin, gray-breasted, 359.
  purple, 444.
Meadowlark, 240, 241, 398.
Merganser, 460.
Mockingbird, 240.
Moorhen, 272.
Nighthawk's Duet, 180.
Nuthatch, red-breasted, 177, 178 (fig.).
  white-breasted, 9.
Oriole, 49.
  Baltimore, 12.
Osprey, 70, 120 (fig.), 398.
Owl, 248 (fig.), 345, 386.
  barn, 103.
  barred, 248.
  great horned, 257, 483 (fig.), 484.
  Rocky Mountain screech, 317.
  screech, 12. 515 (fig.).
  snowy, 513-516 (gen., fig.), 552.
Parakeet, 62, 247,
  bat, 467.
Paroquet, Carolina, 257.
Parrot, 247, 488.
Pelican, 242-244 (gen., fig.), 247, 276.
  brown, 242 (fig.), 243, 244.
  white, 243, 244.
Penguin, yellow-eyed, 342.
Petrel, 342.
  Leach, 251.
Pewee, wood, 415-416 (gen., fig.).
Phaethon aethereus, 360.
Phainopepla, 22, 23.
Pheasant, 62 (hunt), 484.
  ring-necked, 240.
Pigeon, 95, 248, 454.
  passenger, 49 (memorial), 257.
Plover, 514, 515.
Ptarmigan, 183, 514.
Quail, 349, 484.
Quetzal, 59 (rev.).
Rail, clapper, 147.
Raven, 251.
Redstart, 180, 251, 272.
Robin, 12, 240, 241, 487.
  western, 317.
Sandpiper, 514, 516.
  spotted, 182, 252 (fig.).
Sapsucker, red-naped, 177-180 (gen., fig.).
  yellow-bellied, 179.
Snow bunting, 513.
Solitaire, Townsend's, 317.
Sparrow, 349.
  English, 9, 240, 241, 484.
  Lincoln's, 317.
  Savannah, 251.
  song, 240, 251, 253 (fig.).
  vesper, 240.
  western chipping, 317.
  white-throated, 291, 292.
Starling, 240, 241, 333 (rev.), 484.
Streptopelia orientalis, 95.
Sula leucogastra, 359.
Swallow, 62.
  bank, 252.
  barn, 252 (fig.).
  cliff, 252.
  tree, 251, 252.
Swan, 468.
  trumpeter, 49 (rev.), 318, 331.
Swift, 62, 247, 272, 467.
Tanager, scarlet, 240.
Teal, 231.
  cinnamon, 460.
Tern, sooty, 468.
Thrasher, brown, 240, 241.
Thrush, 175.
  black, 248 (fig.).
  British, 466.
  hermit, 291, 292.
  wood, 240, 241.
Towhee, green-tailed, 317.
Tropic bird, red-bellied, 359.
Turkey, wild, 233-236 (gen., fig.), 345.
Verdin, 22.
Wagtail, 272.
Warbler, black and white, 12.
  blackburnian, 12.
  black poll, 251.
  black throated blue, 12.
  Cape May, 12.
  magnolia, 12.
  myrtle, 12, 251.
  yellow, 252 (fig.).
Water ouzel, 264.
Wheatear, 272.
Wild Wings, 115 (rev.).
Wing Tips, 220 (rev.).
Wing to Wing, 336 (rev.).
Woodpecker, 350.
  downy, 12.
  hairy, 12.
  red-headed, 9, 240, 241.
Wren, house, 12.

CONSERVATION

American Planning Annual, 109.
As We See It, 257.
Bounty System, a Farce? 482-484 (gen., fig.).
Canadian Wildlife, 221.
Cattleman Conservationist, 287.
Conservation at Lehigh, 105.
Conservation Committee, 229.
Conservation Funds, 89 (ed.).
Conservation, Micronesia, 455.
Crow Shooting, 287.
Fish, Wildlife booklets, 5 (rev.).
Flying Hunter's Club, 175.
Guns and Civilization 440 (rev.).
Hiker Conservationists, 287.
Hunting License Sales, 175.
Inter-American Conference, 119.
Light Breaks Through, 313 (ed.).
Managing Small Woodlands, 106 (rev.).
Minnesota Emergency, 221.
More Predator Control, 257.
New Zealand Meeting, 342.
Our Plundered Planet, 313 (rev.).
Politics, 455.
Resource-Use, 554.
Road to Survival, 313 (rev.).
Soil building, 141-142 (gen., fig.), 143.
Soil, Normal, 538.
Then the Rains Came, 62.
Waterfowl 7, (Illegal hunting, 182), 343, 348, 349, 425 (gambling with), 511.
Waterfowl shooting, Mexico, 271.
Wildlife Conference, 397.
Wildlife; lesson, 32 (gen., fig.).
Wildlife Management Appropriation, 231.
Woodhouse Night Club, 409-411 (gen., fig.), 442.

DISEASES, DRUGS, MEDICINES, POISONS

Ammonia, 154.
Asthma, 20.
Bacillus anthraces, 420.
Bacterium tularense, 420.
DDT, 538, 539, 540.
Dutch Elm disease, 213.
Fever, dengue, 166, 278.
  malaria, 166, 268.
  yellow, 146, 166, 278.
Filiariasis, 166, 278, 420.
Fireblight, 420.
Insecticides, 538-539 (gen., fig.).
Lockjaw, 423.
Marlate, 286.
Meat, poisoned, 540.
Mosquito-borne diseases, 166-168 (gen., fig.).
Poison, Arsenical, 539.
Poliomyelitis, 423.
Rotenone, 91.
Sabadilla, 91.
Small-pox, 146.
Smut, fig disease, 421.
Sodium thiosulphate, 156.
Surra, 420.
2,4-D, 538, 539, 540.
Weed, spraying, 538-540 (gen., fig.).

FISHES

Anglerfish, 353-354 (gen., fig.), pygmy, 354.
Antennarius scaber, 354.
Bass, 290, 292, 293.
Boxfish, 362 (fig.).
Catfish, 363 (fig.).
Cod, 186.
Fishery Resources, 49 (rev.).
Fishes of Great Lakes, 109 (rev.).
Fish Talk, 361-363 (gen., fig.),
Gourami, 362 (fig.).
Goldfish, 362 (fig.), 487, 488.
Grayling, 515.
Halibut, 186.
Lophius piscatorius, 353.
Minnows, Raising, 385.
Pike, 290.
Puffer, 468.
Rana marina, 354.
Sculpin, 186.
Sting-ray, 468.
Surf Fishing, 328 (rev.).
Trout, 181, 182, 290, 515.
  golden, 263.
Wrasse, 468.

FORESTRY

Fire, 331 (rev.).
Dutch Elm disease, 213.
Forest Conservation, 332.
Forest Co-operative, 1 (rev.).
Forest, the Great, 2-3 (rev.).
Forestry, Woodland life, 498 (rev.).
Logging, 290 (fig.).
National Forests, 439 (rev.).
Silva, North America, 500 (rev.).
Tree Planting, 327 (rev.).
Wildfire, 59 (leaflet).

GARDENS AND GARDENING

Backyard Burbanks, 132-134 (gen., fig.).
Bulb Club, 455.
Farmers, Forty Centuries, 385 (rev.).
Farmer's Handbook, 439 (rev.).
Garden, Flower, 214-215 (gen., fig.).
  Family, 193-200 (gen., fig.).
  Witch Insurance in the, 38-40 (gen., fig.).
Garden Soils, 381 (rev.).
Vegetable Gardens, 90-92 (gen., fig.), 105.

GEOLOGY, MINERALS, METALS AND TOPOGRAPHY

Balds, 124 (gen., fig.).
Calcium, 549.
Carbonates, 549.
Climatic Accidents, Landscapes, 495 (rev.).
Earth's Face, 333 (rev.).
Eruptive Rocks, 381 (rev.).
Galena, 376.
Geology, Historical, 37 (rev.).
Granite, 376.
Graphite, 376.
Helium the Mighty, 18-20 (gen., fig.), 50.
Iron, 375, 549.
Jade, 93 (fig.), 94 (fig.), 96 (fig.).
Limestone, 347.
Magnesium, 18 (fig.), 20, 549.
Mercurial Spray, 539.
Mineral Resources, U. S., 277 (rev.).
Molybdenum, 375-377 (gen., fig.).
Mother Lode Guide, 22 (rev.).
Mountaineering in Scotland, 282-283 (rev.).
Mount Prospect, 282-283 (rev.).
Phosphates, 549.
Potassium, 549.
Rock Quiz, 544, 547.
Schist, 376.
Snow, 543.
Sodium, 549.
Steel, 376, 377.
Sulfates, 549.
Tungsten, 377.

HERBS, SCENTS AND SPICES

Ambrosia, 48.
Angelica, 15.
Anise, 48.
Beebalm, 17.
Bergamot, 15.
Caraway, 17 (fig.), 48.
Catnip, 48.
Chamomile, 48.
Chives, 15 (fig.), 16, 48.
Coriander, 48.
Costmary, 48.
Cumin, 48.
Dill, 15, 48.
Fennel, 48.
Herbs, Use and Decoration, 15-17 (gen., fig.), 48.
Horehound, 16 (fig.).
Horse-radish, 15.
Lavender, 16 (fig.), 48.
Lemon verbena, 48.
Mint, 15 (fig.), 16, 48.
Oswego tea, 17.
Parsley, 15, 16.
Pennyroyal, 15.
Pepper, 15.
Peppermint, 48.
Rosemary, 48.
Rue, 15.
Sage, 15, 17 (fig.).
Santolina, 48.
Sassafras, 48.
Savory, 48.
Snake root, 15.
Spice, 15.
St. John'swort, 48.
Sweet basil, 15, 16 (fig.), 17, 48.
Sweet cicely, 48.
Sweet flag, 15.
Tarragon, 15, 48.
Thyme, 15, 17 (fig.).
  lemon, 48.
Valerian, 15.
Violet, 15.
Viper's bugloss, 48.
Woad, 48.

INSECTS AND OTHER INVERTEBRATES

Aedes aegypti, 166, 167, 168, 223 (fig.), 279 (fig.), 335 (fig.).
  sollicitans, 168.
  triseriatus, 223.
Agrilus bilineatus, 309.
Agriotes mancus, 309.
Anopheles, 222.
  atropos, 167.
  punctipennis, 168.
  quadrimaculatus, 168, 222, 278 (fig.), 334 (fig.).
Ant, 188, 468, 498.
Ant-lion, 352.
Anthrenus scrophulariae, 310.
Arilus cristatus, 188.
Asilus notatus, 421 (gen.).
Aspergilla niger, 421.
Assassin bug, 187-188 (gen., fig.).
Atherix, 421 (gen.).
Balanius rectus, 311.
Bed-bug, 180.
Bee, leaf cutting, 373-374 (gen., fig.).
  solitary, 373, 374.
  yellow jacket, 179.
Beetle, 465.
  asparagus, 305 (fig.), 311 (gen.).
  carpet, 306 (fig.).
  carrion, 305 (fig.), 308 (gen.).
  Colorado, 306 (fig.), 311 (gen.).
  convergent ladybird, 305 (fig.), 308 (gen.).
  cucumber, 91.
  dung, 305 (fig.), 310 (gen.).
  ground, 305 (fig.), 308 (gen.).

Beetle—Con't.
Japanese, 240, 241 (fig.), 307 (fig.), 311 (gen.).
larder, 305 (fig.), 309 (gen.).
May, 307 (fig.), 310 (gen.).
Mexican bean, 305 (fig.), 308, 309 (gen.).
potato, 306 (fig.), 311 (gen.).
rose chafer, 306 (fig.), 311 (gen.).
scarab, 305 (fig.), 310 (gen.).
snout, 311.
squash, 91.
stag, 310 (gen.).
tiger, 305 (fig.), 308 (gen.).
wheat, 305 (fig.), 309 (gen.).
Beetles, 305-312 (gen., fig.).
Bibio albipennis, 420.
Black Powder Mystery, 97-98 (gen., fig.).
Blatella germanica, 84.
Bombylius, 421 (gen.).
major, 56.
Botfly, horse, 423 (gen.).
Buffalo bug, 310 (gen.).
Bumble-bee, 468.
Butterfly, 468.
Lorquin's admiral, 179.
Monarch, 296, 403 (fig.).
mourning-cloak, 179.
Calliphora, 423.
Calosoma frigidum, 308.
Ceuthopilus gracilipes, 87.
Chestnut borer, two-lined, 305 (fig.), 309 (gen.).
Chrysomyia, 423.
Chrysops vittatus, 420.
Cicada, 93 (fig.), 96 (fig.).
Cincindela sexguttata, 308.
Clam, 184.
Cockroach, 102, 188.
German, 81 (fig.), 84 (gen.).
Conocephalus fasciatus, 86.
nemoralis, 86.
Crab, Alaska king, 184-186 (gen., fig.).
hermit, 359.
horseshoe, 205-207 (gen., fig.), 352.
rock, 359.
Cranefly, 295 (fig.).
Crayfish, 352.
Cricket, 102, 465.
cave, 83 (fig.), 87 (gen.).
field, 83 (fig.), 87 (gen.).
Jerusalem, 82 (gen.), 83 (fig.), 87 (gen.).
mole, 81 (fig.), 87 (gen.).
sand, 83 (fig.), 87 (gen.).
snowy tree, 82 (gen., fig.), 87 (gen.).
Crioceris asparagi, 311.
Croton bug, 81 (fig.), 84 (gen.).
Cryptocercus punctulatus, 84.
Culex fatigans, 278 (fig.).
pipiens, 166, 168, 222 (fig.), 334 fig.).
quinquemaculatus, 168.
Curculio, 305 (fig.), 311 (gen.).
Cynomyia, 423.
Daddy-long-legs, 256.
Damselfly, 294 (fig.), 295, 352.
Dermestes lardarius, 309.
Diapheromera femorata, 84.
Dissosteira carolina, 85.
Dolichopus, 421 (gen.).
Dorilas atlanticus, 422 (gen.).
Dragonfly, 296, 297, 351.
Drosophila, 350.
ampelophila, 421.
Dugesia tigrina, 168.
dorotocephala, 168.
Earthworm, 465.
giant, 475-476 (gen., fig.).
Earthworm, Harnessing, 165 (rev.).
Epilachna varivestis, 309.
Eristalis tenax, 351 (fig.).
Erwinia amylivora, 421.
Filaria diurna, 420 (fig.).
Firefly, 305 (fig.), 309 (gen.).
Flea, 102, 175.
snow, 350.
Fly, banded, 296.
bat, 419 (fig.).
bee, 56 (gen.), 417 (fig.), 421 (gen.).
big-eyed, 422 (gen.).
big-headed, 419 (fig.).
black, 514.
blue-bottle, 179.
cluster, 418 (fig.), 422 (gen.).
dance, 280.
deer, 417 (fig.).
drone, 351.
dung, 419 (fig.), 423 (gen.).
flesh, 417 (fig.), 422 (gen.).
fruit, 350, 418 (fig.), 421 (gen.).
green-bottle, 417 (fig.), 423 (gen.).
horse, 417 (fig.).
hump-backed, 280.
long-legged, 280, 419 (fig.).
louse, 418 (fig.).
March, 419 (fig.), 420 (gen.).
robber, 56, 418 (fig.), 421 (gen.).
snipe, 418 (fig.).
soldier, 417 (fig.), 420 (gen.).
stable, 419 (fig.).
syrphid, 419 (fig.), 422 (gen.).
Fly Time, 417-424 (gen., fig.).
Fossil, living, 205-207 (gen., fig.).
Frog-hopper, 295 (fig.).
Gastrophilus intestinalis, 423 (gen.).
Geosargus, 420 (gen.).
Grasshopper, 81-88 (gen., fig.), 102, 103, 295 (fig.), 296 (fig.), 465.
Carolina, 81 (fig.), 85 (gen.).
green, 294 (fig.), 296.
meadow, 81 (fig.), 83, 86.
two-striped, 81 (fig.), 85 (gen.).
Grasshopper Land, 83 (rev.).
Grasshopper, Life of, 82 (rev.).
Grasshoppers and Kin, 81-88 (gen., fig.).
Gryllotalpa hexadactyla, 87.
Gryllus assimilis, 87.
domesticus, 87.
Gymnodinium, 63.
Haemoproteus, 423.
Helix pomata, 147.
Hemaris senta, 97.
Hercostomus, 421.
Hermetia, 420 (gen.).
Hippodamia convergens, 308.
Honeybee, 352, 373 (fig.).
Hornet, 179.
Hydrophorus, 421.
Katydid, broad-winged, 83 (fig.), 86 (gen.).
forked-tail bush, 85 (gen.).
King Crab, 352.
Kissing Bug, 187-188 (gen., fig.).
Insect control, 285.
Insect Guide, 385.
Insects and Men, 82 (rev.).
Insects, strength of, 401-404 (gen., fig.).
Invertebrates, Trap for, 168.
June bug, 310 (gen.).
Lacebug, 402 (fig.).
Leaf roller, 311.
Leptinotarsa decemlineata, 311.
Limulus polyphemus, 206.
Lobster, 352.
Lobster and Crab Fishing, 53 (rev.).
Locust, lesser migratory, 81 (fig.), 82 (gen.), 85 (gen.).
Louse, plant, 403 (fig.).
Lucilia caesar, 423 (gen.).
Lynchia americana, 423 (gen.).
Macrodactylis subspinosus, 311.
Maggot, rat-tailed, 351.
Mantis, 102.
European, 82 (fig.), 84 (gen.).
praying, 82 (gen., fig.), 94, 401 (fig.).
Mantis religiosa, 84.
Mayfly, 351.
Medeterus, 421.
Megachile, 373.
Megascolides australis, 475.
Melanderia, 421.
Melanolestes picipes, 188.
Melanoplus brevittatus, 85.
femur-rubrum, 85.
mexicanus, 85.
spretus, 85.
Melophagus ovinus, 423.
Microcentrum rhombifolium, 86.
Mite, 175.
Mosquito, 166-168 (gen., fig.), 222-223 (gen., fig.), 261, 334-335 (gen., fig.), 351, 314.
house, 166 (fig.).
yellow fever, 166 (fig.).
larvae, 278-279 (gen., fig.).
Moth, 498.
Cecropia, 295.
clear-wing, sphinx, 97 (gen., fig.).
Luna, 352.
primrose, 296.
Mycology, 223.
Myiochrysa, 420 (gen.).
Necrophorus marginatus, 308.
Neoconocephalus robustus, 86.
Neurigona, 421.
Octopus, 489.
Odontomyia, 420 (gen.).
Oecanthus niveus, 87.
Oliva erythrostoma, 37.
porphyria, 37.
Olivella alabamiensis, 37.
baetica, 37.
biplicata, 36.
pedroana, 37.
Olive Shells 36-37 (gen., fig.).
Orchelimum vulgare, 86.
Oyster, 138 (damage to).
Pachygaster, 420.
Paralithodes camtschaticus telesius, 184.
Pectinatella magnifica, 300.
Pholcus phalangioides, 256 (fig.).
Photuris pennsylvanicus, 309.
Phyllophaga, 310.
Phyllium scythe, 84, 85.
Pipunculus, 422.
Planarian, 168.
Plankton, 278.
Pollenia rudis, 422 (gen.).
Polyporus rutilans, 342.
Pomacea caliginosa, 129.
Popillia japonica, 311.
Pseudoleucanus, 310.
Ptilocerus ochraceus, 188.
Rasahus bonotatus, 188.
Reduvius personatus, 188.
Rhagio mystaceus, 421.
Roach, brown wingless, 81 (fig.), 84 (gen.).
wood, 81 (gen., fig.), 84 (gen.).
Sarcophaga haemorroidalis, 422 (gen.).
Scarabaeus sacer, 310.
Scatophaga, 423 (gen.).
ptercoraria, 419 (fig.), 423.
Scorpion, 352, 440.
Scudderia furcata, 85.
Sea cucumber, 186.
Shells, Field Guide, 238.
Shells, Olive, 36-37 (gen., fig.).
Silpha bituberosa, 308.
Snail, European edible, 146-148 (gen., fig.).
fresh-water, 129-131.
Snails, Cockspur Island, 146-148 (gen., fig.).
Spider, grass, 295 (fig.);
house, 256.
squint-eyed, 256 (gen., fig.).
Spirogyra, 95.
Sponge, fresh water, 300 (gen., fig.).
Springtail, 350.
Stagomantis carolina, 84.
Star-fish, 184-186.
Stenopelmatus longispina, 87.
Stomoxys calcitrans, 423.
Stratiomyia, 420 (gen.).
Tabanus stratus, 420 (gen.).
Tachytrechus, 421.
Thinophilus, 421.
Tick, 175.
Trematode, 148.
Trilobite, 206.
Tropical Leaf Insect, 82 (fig.), 85 (gen.).
Tumble-bug, 305 (fig.), 310 (gen.).
Walking-stick, 81 (fig.), 84 (gen.).
Wasp, 296, 352, 468.
Polistes, 364-365 (gen., fig.).
Weevil, chestnut, 305 (fig.), 311 (gen.).
cotton boll, 311.
Wheel-bug, 188.
Wireworm, 305 (fig.), 309 (gen.).

MAMMALS

Alpaca, 442.
Animal Accidents, Yellowstone, 317-318 (gen., fig.).
Animals, Wild, 188 (rev.).
Antelope, pronghorn, 231.
Ape, 467.
Astrakan, 442.
Bear, 78, 181, 264, 317, 471.
Alaska brown, 80 (fig.).
black, 318.
cave, 526.
grizzly, 246, 318.
polar, 245 (fig.).
Bears, Christmas, 423, 545 (gen., fig.).
Beaver, 182, 302, 352, 442.
mountain, 355-357 (gen., fig.), 386.
Bison, 257.
American, 257.
Bobcat, 264, 408.
Buffalo, 98, 231, 318, 455, 471.
Buffalo kill, 287.
Bulldog, 381 (rev.).
Camel, 471.
Caribou, 442.
Cat, 11, 350, 352, 363 (fig.), 467.
Persian, 383.
Cervus mandarinus, 108.
Chimpanzee, 246 (fig.), 247, 500.
Chipmunk, 30, 264, 372.
Cochimo, 189 (gen., fig.), 218.
Cony, 264, 386.
Cougar, 482 (fig.).
Coyote, 482 (fig.), 483, 484.
Deer, 93 (fig.), 148, 181, 231, 290, 392, 471, 483, 537 (slaughter),
spotted, 108.
spotted fallow, 101 (fig.).
white-tailed, 155 (gen., fig.).
Dog, 318, 350, 467, 489.
wild, 270.
Dog Pound to Kleig Lights, 24 (gen., fig.).
Elephant, 467.
Elk, 181, 191, 231, 317 (fig.), 442.
Fisher, 442.
Fox, 345, 482 (fig.), 484.
Arctic, 512 (fig.), 513.
gray, 484.
red, 442.
silver, 249.
Fur Farming, 165 (rev.).
Fur-Seal, 453.
Giraffe, 247 (fig.), 270.
Gopher, pocket, 357.
Gorilla, 466.
Guanaco, 442.
Guinea pig, 487.
Hamster, 487 (fig.).
Hamster Manual, 220 (rev.).
Hare, 93 (fig.), 95 (fig.), 108.
little chief, 355.
Hippopotamus, 468, 471.
Horse, 318 (fig.), 350, 467.
palomino, 19.
Horse of the Americas, 52 (rev.).
Hound, American Trail, 383 (rev.).
Hyena, 471.
Jaguar, 408.
Javelina, 408.
Kangaroo, 352.
Kittens and Crayfish, 28 (fig.), 29 (gen., fig.).
Lemming, 513.
Leopard, 270.
Leopard, Man-Eating, 385 (rev.).
Lepus tolai, 96.
Lion, 270.
Mammal Film, 108.
Mammals, Cactus-Land, 405-408 (gen., fig.).
Mammoth, 471, 526.
Marmot, Golden-Mantled, 301-302 (gen., fig.).
hoary, 301.
Sierra, 301.
Marmota caligata, 301.
flaviventris sierrae, 301.
Marten, 442.
Microsorex winnemana, 79.
Mink, 349.
Misty of Chincoteague, 47 (rev.).
Mole, 352, 465.
Monkey, 467.
Moose, 63, 191-192 (gen., fig.), 231, 290, 292, 317 (fig.), 442.
Moufflon, 442.
Mountain lion, 408, 483.
Mouse, 352, 464.
deer, 30, 31, 516.
field, 465.
grasshopper, 407 (fig.).
meadow, 77.
pocket, 406 (fig.), 407 (fig.).
white, 487.
woodland jumping, 77 (gen., fig.).
Muskrat, 182, 352, 386.
Mustela rixosa allegheniensis, 464
saturatus, 386.
Opossum, 352.
Orang-utan, 466 (fig.).
Otter, 317.
sea, 257.
Ox, 527.
Pig, 350.
guinea, 189.
Pika, 355.
Porcupine, 148, 302, 352 (fig.), 489.
Puma, Eastern, 221.
Rabbit, 43 (fig.), 349, 466, 483, 487-489 (gen., fig.).
swamp, 72.
Raccoon, 119 (hunt), 148, 349, 409, 410 (fig.), 411.
Rat, cotton, 148.
hooded, 487-488
kangaroo, 406 (fig.).
pack, 406 (fig.).
rice, 148.
white, 487, 488.
Reindeer, 442.
Rhinoceros, woolly, 526.
Ring-tailed cat, 408 (fig.).
Rockchuck, 301.
Rodent's Gnawing Habits, 30-31 (gen., fig.).
Seal, brown, 468.
fur, 245, 270.
Sea Lion Slaughter, 5.
Sheep, desert bighorn, 231.
mountain, 181, 182, 264.
Rocky Mountain bighorn, 231.
Shrew, 465.
least pygmy, 79-80 (gen., fig.).
Maryland long-tailed, 80.
short-tailed, 80.
Skunk, 352 (fig.), 408.
hog-nosed, 405 (fig.).
spotted, 386, 405 (fig.).
striped, 409-411 (gen., fig.).
Squirrel, 10 (fig.), 264, 345, 349, 352.
flying, 30.
gray, 30, 31, 62.
pine, 179 (fig.).
red, 30, 31.
Swine, wild, 466.
Tiger, sabre-toothed, 471.
Vicuna, 442.
Vole, meadow, 465.
Vulpes, the Red Fox, 226-227 (rev.).
Wallaby, Rock, 433 (gen., fig).
Weasel, 269 (fig.), 386.
least, 464-465 (gen., fig.), 498.
Whale, whalebone, 59 (rev.).
Wild Animal Parenthood, 245-247 (gen., fig.), 270.
Wildcat, 484.
Wolf, 482 (fig.), 484.
Woodchuck, 181.
Western, 301-302 (gen., fig.).
Zebra, 101 (fig.), 442.

MICROSCOPY

Fruit, under microscope, 502-504 (gen., fig.).
Historical Outline, 280, 335-336.
Microscope, new, 388-392 (gen.-fig.).
Microscope, student, 504.
Public Exhibition, 110-112 (gen., fig.).
Under the Microscope, 54-56 (gen., fig.), 110-112 (gen., fig.), 166-168 (gen., fig.), 222-224 (gen., fig.), 280 (gen., fig.), 334-335 (gen., fig.), 388-392 (gen., fig.), 446-448 (gen., fig.), 502-504 (gen., fig.), 555-556 (gen., fig.).

NATURE EDUCATION

As We See It, 369.
BB Gun, 63.
Beetles in School, 326-327.
Bird Quiz, 123.
Cache Lake Country, 170-171 (rev.).

Camping, 328.
Children as Naturalists, 440 (rev.).
Cleveland Museum, Natural History, 303 (fig.).
Colorado Leaflets, 5 (rev.).
Come Climb My Hill, 115 (rev.).
Contents Noted, 7, 63, 119, 175, 287, 343, 399, 455, 511.
Desert Parade, 47 (rev.).
Discovering Our World, 53 (rev.).
General Zoology, 1 (rev.).
Historical Outline, 280, 335-336.
Hitting the Dark Trail, 173 (rev.).
Introduction, History of Science, 286 (rev.).
Island Life (Michigan), 441 (rev.).
Limnological Records, 439 (rev.).
Milwaukee's Pet Library, 487-489 (gen., fig.), 499.
National Assoc. Biology Teachers, 46, 160-161, 216, 328.
Native Habitat, 321 (puzzle).
Naturalists, English, 5 (rev.).
Nature Camp, 159, 332.
Nature Dances, 428-431 (gen., fig.), 442.
Nature Hobbies, 59 (rev.).
Nature in Print, 2-3, 58-59, 114-115, 170-171, 226-227, 282-283, 338-339, 394-395, 450-451, 506-507.
Nature Lover's Knapsack, 115 (rev.).
Nature on Wheels, 303-304 (gen., fig.).
Nature, Pro and Con, 76 (game).
Nature Quests and Quizzes, 173 (rev.).
Nature Study Society, 104, 160, 274.
Nature Trail, Florida, 346 (fig.).
One Day on Teton Marsh, 58-59 (rev.).
One-Man Nature Center, 69-72 (gen., fig.).
One World, 121-123 (gen., fig.).
Ornithology Notebook, 55-56 (rev.).
Orthoptera, in School, 102-103.
Outdoor Education, Urban, 384.
Pacific Discovery, 105 (rev.).
Portraits in Music, 341.
Recreation Major, 52.
Sanity Rare, 115 (rev.).
School Page, 45, 52, 102-103, 158-159, 214-215, 269 (fig.), 326-327, 438-439, 494-495, 546-547.
Schoolroom in the Woods, 204 (gen., fig.), 218.
Selected Writings of Benjamin Rush, 53 (rev.).
Sierra Club, 157 (rev.), 333 (rev., bulletins).
Sierra Nevada, 338 (rev.).
Smithsonian's Catalog, 161.
Spring at Trapper's Lake, 181-183 (gen., fig.), 218.
Stream Growth, 140 (fig.), 141 (fig.).
Techniques for Group Leadership, 274.
The Good Earth, 83 (rev.).
The Wilding Heart, 114-115 (rev.).
Tiny Animal Stories, 273 (rev.).
Tracks and Trailcraft, 441 (rev.).
Trees, Knowing, 217 (rev.).
We Harness a River, 114-115 (rev.).
Westinghouse Science Awards, 498.
Wild Folk, Pond, 441 (rev.).
Wildlife as a Profession, 201.
Zoology, 433 (rev.).

PARKS AND REFUGES

Acadia National Park, 220 (fire).
Australian Sanctuary, 217.
Boy-Planned Vacation, 262-264 (gen., fig.), 276.
Camp O'Leno State Park, 346.
Caverns, Florida, 345, 348 (fig.).
Chain O'Lakes, 258-261 (gen., fig.), 272.
Crooked Lake, 291 (fig.).
Florida's Varied Parks, 345-349 (gen., fig.).
Fort Clinch State Park, 348 (fig.).
Gaddy's Geese, 457-460 (gen., fig.), 498.
Gold Head Branch State Park, 346.
Hawk Mountain Sanctuary, 399.
Hillsborough River State Park, 344 (fig.), 346, 347.
Jackson Hole, 455.
Kent Island, Avian Paradise, 249-253 (gen., fig.).
Lac La Croix, 288 (fig.).
Myakka River State Park, 347-348 (gen., fig.).
National Parks Exploitation, 369 (ed.).
Olympic Park, 5.
Park Income, 497.
Quetico-Superior, 397.
Save Solitude, 145 (gen., fig.).
Sierra Nevada, 338-339 (rev.).
Statue of Liberty, 7.
Stoneharbor Sanctuary, 277.
Temperance River Gorge, 291 (fig.).
Torreya State Park, 345.
Trapper's Lake, Spring, 181-183 (gen., fig.), 218.
Voyageur's Return, 289-293 (gen., fig.), 330-331.
Waterfall, 143 (fig.).
White Oak Canyon, 137-144 (gen., fig.).
Yellowstone, Yarns, 109 (rev.).

PHOTOGRAPHY

Camera Trails, 43-44 (gen., fig.), 101 (gen., fig.), 106, 156-157 (gen., fig.), 212-213 (gen., fig.), 267-268 (gen., fig.), 324-325 (gen., fig.), 380 (gen., fig.), 382, 436-437 (gen., fig.), 492-493 (gen., fig.), 548, 550.
Flower Pictures, 380 (gen., fig.), 382.
Nature and the Camera, 106 (rev.).
Photography, history, 156-157 (gen., fig.), 212-213.
Zoo photography, 101 (gen., fig.), 106.

PLANTS, GENERAL

Acaena, 371, 372.
Alfalfa, 503.
Alyssum, sweet, 200.
Anemone, 371.
Anise, 503.
Anthemis, 136.
Aquilegia caerulea, 199.
  chrysantha, 199.
  flabellata, 199.
  formosa, 199.
  glandulosa, 199.
  skinneri, 199.
  vulgaris, 199.
Arrowhead, 72.
Arundinaria gigantea, 98 (fig.).
Asclepias syriaca, 211.
Asplenium radicans, 150.
  viviparum, 150.
Aster, 372.
Babiana, 371.
Bachelor's buttons, 136.
Banana, 503.
Barley, 503.
Bean, bush, 91.
  green, 135.
  Kentucky wonder, 82.
  lima, 135.
  string, 502.
  sweet, 95.
  wax, 135.
Beardtongue, 27 (fig.).
Beet, 92, 471.
Begonia, 370.
  tuberous, 161.
Begonia phyllomaniaca, 151.
  heracleifolia, 151.
Belvedere, 193 (fig.), 199 (gen.).
Berry (defined), 502 (fig.), 503.
Bittersweet, 39 (fig.).
Blackberry, 503.
Black-eyed susan, 366-367 (gen., fig.).
Bladdernut, 39.
Bladderwort, 261.
Blazing star, 27 (fig.).
Bleeding heart, 193 (fig.), 195, 196 (gen.).
Blue flax, 27 (fig.).
Botany, 381 (rev.).
Botany, New Spain, 117 (rev.).
Broccoli, 91, 92, 371.
Broom, 342.
Brown-eyed susan, 71.
Brussels sprouts, 92, 371.
Bryophyllum calycinum, 151 (fig.), 164.
  crenatum, 151 (fig.), 164.
  proliferum, 164.
Bulrush, 71.
Buttercup, 503.
Button ball, 72.
Buttonbush, 349.
Cabbage, 92.
  Chinese, 91.
Cactus, opuntia, 371 (fig.), 392.
Caladium, 161.
Calceolaria, 370.
Calendula, 372.
Camptosorus rhizophyllus, 149.
Candytuft, 370.
Cane, 98 (gen., fig.).
Cantaloupe, 503.
Caraway, 503.
Cardinal flower, 371.
Carrot, 91, 92, 135, 503.
Caryopsis, 503.
Catkin, 392.
Cauliflower, 92, 371.
Centaurea, 372.
Ceratopteris thalictroides, 150.
Chaenactis, 370 (fig.), 392.
Chara, 259.
Chicory, 136.
Cinquefoil, 261.
  leafy, 25 (fig.), 26 (fig.).
Clarkia, 371.
Clematis, 371, 372.
Clover, four-leafed, 140.
Clubmoss, common, 529 (fig.), 532 (gen.).
Cocklebur, 25 (fig.).
Columbine, 194 (fig.), 199 (gen.).
Corn, 90, 503.
  sweet, 91, 135, 136 (fig.).
Cosmos, 135.
Cranberry, 260, (fig.), 503.
Cranesbill, 27 (fig.).
Crassula arborea, 150 (fig.).
Crepis, 53 (rev.).
Crocus, 195 (fig.), 198 (gen.).
  biflorus, 198.
  moesiacus, 198.
  sativus, 198.
  susianus, 198.
  virnus, 198.
Cucumber, 91, 503.
  wild, 26 (fig.), 27 (gen.).
Cyclamen, 372.
Daffodil, 193 (fig.), 198 (gen.).
Dandelion, 539.
Datura, 524 (gen., fig.).
  arborea, 524.
  suaveolens, 524.
Dead men's bells, 38 (fig.).
Delphinium, 136, 372.
Dewberry, 503.
Dianthus, 196.
  chinensis, 196.
  deltoides, 196.
  plumaris, 196.
Dicentra spectabilis, 196.
Digitalis, 15.
Dock, 26 (fig.).
Drosera rotundifolia, 261.
Drupe, 502-503 (fig., defined).
Dryopteris effusa, 150.
Duckweed, 190.
Eel grass, 190.
Eggplant, 92.
Elephant ear, 161.
Elk-brake, 386.
Endive, 91.
Eschscholtzia californica, 196.
Evening star, 27 (fig.).
Fern, adder's tongue, 259 (fig.), 261.
  bracken, 38, 39 (fig.).
  Christmas, 150.
  marsh, 259.
  spleenwort, 150 (fig.), 151 (fig.).
  sword, 386.
  walking, 149, 150, 151 (fig.).
Flax, 38, 39.
Flowering World, 2-3 (rev.).
Flowers, Prairie and Woodland, 217 (rev.).
Fomes japonica, 108.
Foxglove, 15, 39.
Fruit, defined, 502-503 (gen., fig.).
Fungus, 93 (fig.).
Garlic, 39 (fig.), 40.
Garrya, 370 (fig.).
  Elliptica, 392.
Gaultheria procumbefis, 523 (gen.).
Gentian, closed, 40.
Geranium, 372.
  wild, 27 (fig.).
Gloxinia, 151.
Glyceria striata, 294.
Godetia, 371.
Goldenrod, 71.
Golden-eardrops, 372.
Gorse, 342.
Gourd, 93 (fig.).
Grass, clump of, 294-297 (gen., fig.).
Grass, crab, 539.
Gumweed, 26 (fig.).
Hag's tapers, 39 (fig.).
Harebell, 26 (fig.), 27 (fig.), 39.
Heartsease, 193 (fig.), 197 (gen.).
Heliotrope, 40.
Hemp, bowstring, 150, 151.
Hollyhock, 40.
Honeysuckle, 392.
  wild, 97.
Honey Plants, American, 52 (rev.).
Impatiens, 372.
Iris breeding, 132-134 (gen., fig.).
Iris, German, 146 (fig.), 199 (gen.).
  prairie, 348.
Iris germanica, 199.
Jimson weed, 503.
Jonquil, 195.
Jujube, 95.
Kale, 91, 371.
Kochia scoparia, 199.
  trichophylla, 199.
  vestita, 199.
Kohlrabi, 91, 371.
Larkspur, 136.
Lathyrus, odoratus, 197.
Lavender, English, 372.
Leek, 91.
Lemon, wild, 255.
Lettuce, 91.
  cos, 91.
  Romaine, 91.
Lichen Book, 52 (rev.).
Life plant, 149 (fig.), 151 (gen.).
Lilac, 136.
  wild, 372.
Lilium tigrinum, 199.
Lily, tiger, 194 (fig.), 199 (gen.).
Lonicera subspicata, 97.
Loosestrife, purple, 72.
Lupine, 372.
  alkaloid, 63.
  blue, 63.
  yellow, 63.
Lycopodium clavatum, 532.
Mandrake, 254-255 (gen., fig.).
  European, 255.
Marigold, 40, 136.
Marsh-marigold, 543.
May-apple, 254-255 (gen., fig.).
Mesembryanthemum, 371.
Milkweed, 26 (fig.), 27 (fig.), 211 (gen., fig.), 372, 503.
  albino, 211 (fig.).
Mitchella repens, 523 (gen.).
Monkshood, 39.
Morning-glory, 26.
Moss, sphagnum, 259, 260, 529 (fig.), 532 (gen.).
Mulberry, 504.
Mullein, 27 (fig.), 38, 136, 194.
Mushroom, 40.
Mustard, 503.
Miner's candle, 27 (fig.).
Mint, 27 (fig.).
Narcissus pseudo-narcissus, 198.
Nasturtium, 194 (fig.), 195 197 (gen.).
Oats, 503.
Onion, 91.
  Bermuda, 135.
Ophioglossum vulgatum, 261.
Orchid, butterfly, 347.
  pink lady's slipper, 261.
Oxalis, 372.
Pansy, 193 (fig.), 195, 197 (gen.), 372.
Papaver orientale, 196.
  wild, 27 (fig.).
Parsley, 371, 503.
Parsnip, 371, 503.
Partridge berry, 529 (fig.), 535 (gen.).
Pea, 91, 135, 371, 503.
Peanut, 95.
Pear, 503.
Peat moss, 260.
Peony, 503.
Pepo, 503 (defined).
Pepper, 371.
Pericarp, 503 (defined).
Petunia, 135 (fig.), 136, 195 (fig.), 197 (gen.).
  axillaris, 197.
  hybrida, 197.
  violacea, 197.
Phlox, 38, 372.
Pickerel weed, 349.
Pigweed, 71.
Pineapple, 504.
Pink, 193 (fig.), 196 (gen.).
Pitcher plant, 258 (fig.), 259, 260.
Plant Anatomy, 1 (rev.).
Plant Biology, 229 (rev.).
Plants, Christmas, 529-536 (gen., fig.).
Plants from Leaves, 149-152 (gen., fig.), 164.
Plant Stars, 135-136 (gen., fig.), 161.
Plants, Story of, 383 (rev.).
Podophyllum peltatum, 254.
Poison ivy, 26 (fig.), 231.
Polystichum plaschinckianum, 150.
Pond lily, yellow, 71.
Poppy, 193 (fig.), 194, 196 (gen.), 503.
  California, 193 (fig.), 196 (gen.), 372.
  glaucium, 372.
  prickly, 26 (fig.), 27 (fig.).
  wild tree, 372.
Portulaca, 200.
Potentilla palustris, 261.
Primula, Cultivated, 229 (rev.).
Primula acaulis, 197.
  elatior, 197.
  polyantha, 197.
  variabilis, 197.
  veris, 197.
Primrose, 193 (fig.), 197 (gen.).
  evening, 27 (fig.).
Pteris aquilina, 386.
Pumpkin, 503.
Radish, 91.
Ragweed, 348.
Ranunculus, 372.
Rice, 503.
Rose, 136.
  tea, 135 (fig.).
Rubus parviflorus, 386.
Rye, 503.
Sansevieria, 150.
Sarracenia purpurea, 259.
Sawgrass, 72.
Saxifrage, 370.
Scilla amoena, 198.
  hispanica, 198.
  nonscripta, 198.
  peruviana, 198.
  sibirica, 197.
Scutellaria gallericulata, 261.
Seed-Saving, 370-372 (gen., fig.), 392.
Shepherd's purse, 503.
Skullcap, 261.
Skunk cabbage, 126, 195.
Smartweed, 72, 349.
Solanum rostratum, 311.
Spanish moss, 530 (fig.), 533 (gen.).
Sphagnum capillaceum, 532.
Spider lily, 72.
Spiderwort, 195 (fig.), 198 (gen.).
Spinach, New Zealand, 91.
Spiranthes cernum, 261.
Spleenwort, viviparous, 150 (fig.).
  walking, 151 (fig.).
Squash, 503.
  acorn, 91, 92.
  bush, 91.
  butternut, 92.
  Hubbard, 91.
  summer, 92.
Squill, Siberian, 195 (fig.), 198 (gen.).
St. Johnswort, 40.
Strawberry, 502, 504.
Summer cypress, 193 (fig.), 199 (gen.).
Sundew, 261.
Sunflower, 9, 136, 503.
Sweet Pea, 193 (fig.), 197 (gen.).
Sweet-potato, 503.
Swiss chard, 91.

Tampala, 91.
Thistle, cobweb, 371 (fig.), 372.
Thyme, 40.
Tick trefoil, 503.
Tillandsia usneioides, 533 (gen.).
Tomato, 91, 135, 136 (ng.), 371, 502 (fig.), 503.
Tradescantia, 198.
virginiana, 198.
Tropaeolum majus, 197.
Tulip, 195 (fig.), 199 (gen.).
Tulip Society, 189.
Tumbleweed, Russian, 25 (fig.).
Turnip, 91.
Umbrella leaf, 255.
Vervain root, 39 (fig.).
Viola arvensis, 197.
rafinesquii, 197.
tricolor, 197.
Violet, African, 161.
redwood, 372.
Virgin's bower, 27 (fig.).
Water chestnut, 371.
Waterlily, 503.
Watermelon, 503.
Wheat, 90, 503.
Wild Flowers, Beginner's Guide, 341 (rev.).
Winter green, 531 (fig.), 535 (gen.).
Winter Skeletons, 25-27 (gen., fig.).
Witches' thimbles, 38 (fig.), 39.
Yarrow, 39.
Yucca, 26 (fig.).
Zinnia, 372.

REPTILES AND AMPHIBIANS

Adder, spreading, 259.
Alligator, 347, 349, 350, 461-463 (gen., fig.).
Amphibians, reptiles, Pac. States, 53 (rev.).
Chameleon, 73-76 (gen., fig.).
Chameleon dilepis, 76.
Dinosaur, 242.
Frog, bullfrog, 128 (fig.), 162.
cricket, 162.
eastern wood, 125 (fig.), 126, 127, 128.
green, 162.
green tree, 128 (fig.), 164.
leopard, 126 (fig.), 128, 162.
pickerel, 162.
spring peeper, 125 (fig.), 126, 127, 128, 190.
striped chorus, 126 (fig.), 128.
Frogs and Toads, 125-128 (gen., fig.), 162, 164.
Gila monster, 352.
Lizard, 351 (fig.), 386.
Lizard, basilisk, 359.
Poisonous Desert Dwellers, 47 (rev.).
Pterodactyl, 242.
Salamander, 127.
Serpent, 94, 95.
Snake, 351 (fig.).
garter, 352, 386.
king, 368.
moccasin, cotton-mouth, 70.
rattlesnake, 352.
ringed, 466.
timber rattlesnake, 233, 236 (gen., fig.).
water, 352, 386.
Tadpole, 190 (gen., fig.), 220.
Toad, common tree, 127 (fig.), 162.
Fowler's, 127 (fig.), 162.
Tortoise, 43 (fig.), 93, 94, 95 (fig.).
Turtle, 11, 349, 352, 487, 482.

TREES AND SHRUBS

Acorn, 503.
Aesculus californica, 21.
Alder, 21, 25, 179.
Almond, 503.
Apple, 161, 503.
Apricot, 503.
Arborvitae, 108.
Ash, 503.
canyon, 21.
Aspen, 179.
Avocado, 503.
Bamboo, 93 (fig.), 98.
Barberry, Japanese, 38, 531 (fig.), 533 (gen.).
Bayberry, 531 (fig.), 532 (gen.).
Beech, 148, 345.
copper, 136.
Berberis aquifolium, 534 (gen.).
thunbergii, 533 (gen.).
Birch, 38 (fig.), 148, 178, 179.
Bittersweet, 529 (fig.), 533 (gen.).
Black Alder, 530 (ng.), 532 (gen.).
Blueberry, 503.
Brazil nut, 503.
Buckeye, 21.
Burning bush, 530 (fig.), 533 (gen.).
Butternut, 30, 31.
Cedar, incense, 22.
Celastrus scandens, 533 (gen.).
Chamaedaphne calyculata, 260.
Cherry, 502 (fig.), 503.
Chestnut, 503.
blight-resistant, 136.
Chinaberry, 146.
Coconut, 11, 503.
Coffee, 503.
Cork, composition, 202 (fig.).
Cork Tree from Spain, 202-203 (gen., fig.), 218.
Cottonwood, 21, 392.
Cucumber Tree, 319 (gen., fig.).
Currant, 392, 505.
Cypress, 347.
Dryas, 513.
Date, 503.
Elderberry, 40, 72.
Elm, 148, 503.
Camperdown, 118 (fig.).
Euphorbia pulcherrima, 534 (gen.).
Evonymus atropurpureus, 533 (gen.).
Fir, Douglas, 66.
red, 246.
Gooseberry, 503.
Gopher wood, 345.
Grape, 503.
Grapefruit, 503.
Ground hemlock, 532.
Guava, 503.
Gum, 345.
sweet, 349.
Hackberry, 345.
Hawthorn, 40.
Hazel, 40.
Hemlock, 65, 140 (gen., fig.), 148.
Hickory, 30 (fig., nut), 345, 503.
Holly, 349, 530 (fig.), 535 (gen.).
Ironwood, 148.
Ilex opaca, 535 (gen.).
verticillata, 535 (gen.).
Juniper, 66.
Juniper californica, 21, 22.
desert, 22.
Sierra, 22.
Kalmia latifolia, 535 (gen.).
Kauri, 342.
Larch, 178, 179.
Leatherleaf, 259, 260.
Lemon, 503.
Litchi, Chinese-American, 521-522 (gen., fig.).
Lilac, wild, 372.
Lime, 503.
Loganberry, 503.
Magnolia acuminata, 319.
Mango, 503.
Maple, 148, 179, 345.
Norway, 136.
water, 71.
Mesquite, 22 (fig.), 23.
honey, 23.
screw-bean, 23.
Metasequoia, 343.
Mimosa, 146.
Mistletoe, 21-23 (gen., fig.), 50.
American, 531 (fig.), 535 (gen.).
big leaf, 21.
pink-berried, 21, 23.
Mountain-ash, 38 (ng.), 39 (fig.).
Mountain laurel, 531 (ng.), 535 (gen.).
Mountain mahogany, 372.
Myrica cerifera, 532 (gen.).
Oak, 345, 347.
blue, 22.
cork, 202-203 (gen., fig.), 218.
Kellogg, 22.
laurel, 347 (fig.).
live, 21, 348.
red, 138 (fig.).
white, 139 (gen., fig.).
Olive, 503.
Ombu, 412-414 (gen., fig.).
Orange, 503.
dwarf, 161.
Oregon grape, 531 (fig.), 534 (gen.).
Palm, 349.
cabbage, 347.
coconut, 359.
Palmetto, cabbage, 473.
Papaya, 503.
Peach, 93 (gen., fig.), 503.
Pear, 39.
Pecan, 503.
Pepper, California, 530 (fig.), 534 (gen.).
Persimmon, 503.
Phoradendron californica, 23.
densum, 22.
flavescens, 21, 50, 533 (gen.).
libocedri, 22.
villosum, 21, 50.
Pine, 148, 262, 349.
Monterey, 50.
pinyon, 22, 66.
ponderosa, 66, 204.
yellow, 66.
Plum, 31 (fig., seed), 503.
Poinsettia, 531 (ng.), 534 (gen.).
Poplar, 148, 373.
Quercus lobata, 22.
suber, 202.
Quince, 503.
Raspberry, 502 (fig.), 503.
Redwood, 48 (rev., booklets), 65 (fig.), 343.
Rowan tree, 38.
Rhus typhina, 534 (gen.).
Schinus molle, 534 (gen.).
Sequoia, 66, 262.
Spruce, 148.
Engelman, 182.
white, 251.
Sumac, staghorn, 531 (fig.), 534 (gen.).
Sycamore, 21.
Tamarack, 178, 259.
Taxus canadensis, 532 (gen.).
Thimble-berry, 386.
Torreya, 345, 346.
Tree, Fall of, 426-427.
Tree Laboratories, 494-495.
Tree Rings, 65-68 (gen., fig.).
Trees and Toadstools, 115 (rev.).
Viscum album, 21, 50.
Walnut, 20, 21, 503.
black, 31.
Wax myrtle, 72.
Willow, 72, 96 (fig.), 148, 179, 349, 392.
pussy, 26 (fig.).
Willow gall, 27 (fig.).
Winterberry, 535.
Witch hazel, 372.
Yew, 531 (fig.), 532 (gen.).
Florida, 346.

MISCELLANEOUS

Alphabet, 339 (rev.).
Ammonia, 99.
A Spring Walk, 183.
Billboards, 287, 343, 477-480 (gen., fig.), 500.
Carbon dioxide, 99, 100.
Chinese Symbolism, 93-96 (gen., fig.).
Color Language of Nature, 207.
Dragons (in movies), 461-463 (gen., fig.).
Electrons, 543.
Esperanto, 231.
Felted Footballs, 304 (gen., fig.), 397.
Fire, 331 (rev.).
Genetics, 224 (rev.).
Guide to America, 44 (rev.).
Highway Opportunity, 477-480 (gen., fig.), 498.
How Animals Sleep, 466-468 (gen., fig.), 498.
Information Roundup, 333 (rev.).
Kennel Building, 59 (rev.).
Lake Okeechobee, 339 (rev.).
Let's Have an Epidemic, 320-321 gen., fig.).
Methane, 99.
Nitrogen, 100.
Nurserymen for Roadsides, 500.
Oxygen, 99.
Roadside Beautification, Pa., 7.
Rock Spring, 298-300 (gen., fig.).
Sea Flavor, 338 (rev.).
Tail Tales, 350-351 (gen., fig.).
Tinajas, Desert, 472.
Treasury of American Superstition, 286 (rev.).
Tropical Idyl ,189 (gen., fig.), 218.
Weather Technique, 115 (rev.).
Weather, Texas, 517-519 (gen., fig.), 552.
World View, 481.

AUTHORS

Abbott, J. M., 248, 272.
Allard, J. A., 58.
Allen, Sara Van A., 338.
Arnold, H., 438.
Avery, F. S., 528
Baker, May A., 2, 460.
Barker, L., 433.
Baumgartner, Marguerite A., 513-516, 552.
Berryman, Margaret M., 176, 435.
Binny. H. B., 398.
Blackford, J. L., 177-180, 472.
Bloch, R. S., 303-304.
Brackbill, H., 240-241.
Broun, M., 490-491, 500.
Brown, Elinor H., 12.
Brown, Lurene, 68.
Browne, Linda W., 472.
Burns, C., 25-28.
Burroughs, J., 415-416.
Carhart, A. H., 132-134.
Chamblerlin, B., 242-244, 276.
Chick, W. D., Jr., 274.
Collett, R. H., 491.
Corrington, J. D., 54-56, 110-112, 166-168, 222-224, 278-280, 334-336, 388-392, 446-448, 502-504, 555-556.
Crawford, L. B., 181-183, 218.
Cruickshank. A. D., 205-207.
Dailey, Vivien B., 62.
Davis, Grace S., 36-37.
DeHorvath, Felice, 426.
Dembitz, E., 544-547.
Derleth, A., 120.
Devoe, A., 121-123.
Devol, Elsie H., 297, 416.
Dexter, R. W., 440.
Dodge, Ruth A., 328.
Dornbrook, D., 487-489, 501.
Dowling, A. W., 318.
Drake, Leah B., 23.
Drake, Olive, 45.
Eckert, T. E., 211.
Eicher, Elizabeth, 123.
Ericson, Mildred J., 317-318.
Evans, Edna H., 43-44, 101, 106, 156-157, 212-213, 237-239. 270, 267-268, 324-325, 380, 382, 436-437, 492-493, 517-520, 548-549, 550, 552.
Evans, W. H., 97-98.
Frank, B., 137-144.
Friedrich, G., 463.
Fuller, Ethel R., 170.
Furman, Lucy, 409-411, 442.
Geiger, Helen H., 516.
Gibbs, Elsie L., 154.
Gibbs, Ruth M., 486.
Gile, Louisa B., 394.
Gilliam, C. E., 152, 319, 506.
Goetsch, Bertha L., 464-465, 498.
Goodman, Mae W., 114, 226.
Green. Charlotte H., 457-460, 498.
Gregory, J. M., 521-522.
Gudger, E. W., 535-354.
Gulick, Harriett F., 398.
Hadley, T. E., 118.
Harper, S. A., 188.
Harrison, M. C., 465.
Hartwick, Ethelyn M., 192.
Hellyer. D., 482-484.
Henge, Katharine C., 543.
Hertzler, R., 184-186.
Higinbotham, Betty W., 258-261, 272.
Hill, Bertha, 398.
Hill, Leona A., 282.
Hosmer, Margaret S., 269.
Hoxie, Emily N., 416.
Hoyt, V. C., 264.
Hubbard, W. P., 233-236.
Huggins, Mabel I., 76, 93-96, 108, 207, 321, 414.
Jaeger, E., 428-431, 442, 523, 552.
James, Ida E., 349.
James, Julia C., 230-320-321.
Korte, Dorothy, 454.
Lane, F. W., 466-468, 498.
Larsen, J. D., 538-540.
Laycock, G., 202-203, 218.
Lewis, Isabel M., 41-42, 52, 99-100, 106, 153-154, 157, 208-210, 218, 265-266, 272, 322-323, 378-379, 392, 434-435, 444, 485-486, 497, 541-542.
Loring, J. A., 355-357, 386.
Loughlin, J., 475-476.
Lowry, L., 32.
Mann, R., 384.
Mansuetti, R., 79-80, 125-128, 162.
McAtee, W. L., 62, 98, 103, 124, 173, 180, 236, 440. 543.
McBryde, J. M., 444.
McKenzie, M., 148.
McMurtry, Edna H., 122.
Middleton, Cosette, 326.
Miller, N. L., 187-188.
Miller, W. T., 73-76.
Minck, Grace S., 40, 323.
Mohr, C. E., 160.
Mowery, Peggy, 190, 220.
Murphy, Grace E., 342.
Neff, E. D., 13-14, 50, 469-471, 500, 525-528.
Nelson, Betty M., 565-568.
Nelson, E. W., 18-20, 50, 375-377.
Nixon, J. E., 377.
Nixon, R. A., 304.
O'Donnell, P., 78.
Oehser, P.H ., 544.
Olson, L., 289-293, 330.
Palmer, E. L., 45-46, 52, 81-88, 102-103, 158-159, 160-161, 193-200, 214-215, 216, 269-272, 305-312, 326-327, 417-424. 438, 494-495, 529-536, 546-547.
Pascal, Sister M., 261.
Phillips. R. S., 300.
Pickwell, G., 301-302.
Pittman, H. H., 374-375.
Rasey, Ruth M., 298-300.
Ray, Grace E., 191-192.
Rowntree, Lester, 21-23, 50, 370-372, 392.
Sargent, R. M., 426-427.
Schaldach, W. J., 405-408.
Scherer, L., 77-78.
Schroder, H. H., 129-131.
Schulz, W. G., 204, 218.
Scoggin, Lewis G., 345-349.
Sharritt, Grace V., 24.
Sheats, Dorothea, 262-264, 276.
Sherbakoff, May G., 484.
Skutch, A. F., 149-152, 164, 358-360, 386.
Smythe, D., 304, 316, 427.
Sollberger, D. E., 30-31.
Stanley, Irene, 123, 180.
Starkweather, Pauline, 100.
Steffek, E. F., 543.
Stott, J. K., 245-247, 270.
Sweney, Ruth H., 9-12.
Tarnowsky, I., 137-144.
Taylor, B. F., 456.
Teale, E. W., 69-72, 294-297, 350-352, 386, 401-404.
Thayer, Eleanor, 546.
Tomkins, I. R., 146-147.
Troubetzkoy, U., 372.
Tyrrell, W. B., 249-253.
Van Dore, W., 12, 158.
Van Hoesen, Sophie, 524.
Watson, T., 189, 218.
Watts, May T, 38-40.
Weaver, R. L., 104, 554.
Westwood, R. W., 7, 33-35, 50, 63, 119, 173, 175, 231, 287, 343, 399, 455, 507, 511.
White, J. W., 412-414.
Wing, A. S., 15-17, 48, 90-92, 105, 135-136, 161, 314-316.
Whidding, J. G., 20, 102, 266, 379.
Woodall, A. E., 214.
Woodford, W. A., 413.
Woodson, W. D., 461-463.
Wyatt-Semple, Sue, 42.
Zahniser, H., 2-3, 58-59, 114-115, 170-171, 266-267, 282-283, 338-339, 394-395, 450-451, 506-507.

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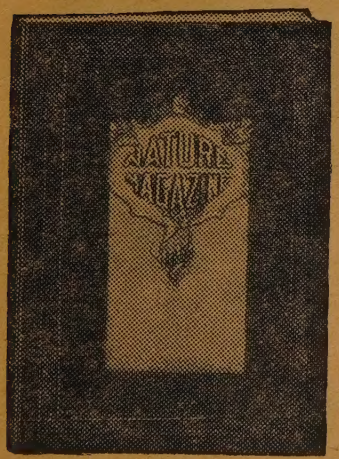

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